MENTAL ILLNESS AND NURSING FACILITIES: PREDICTORS OF HEALTH SERVICES USE

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EXECUTIVE SUMMARY

This study considers the relationship between mental illness and nursing facility use as well as the use of mental health services within nursing facilities and in the community. Three data sets are used in this study: the 1985 National Nursing Home Survey; the 1987 National Medical Expenditure Survey, Institutional Population Component; and the 1991 and 1992 Medicare Current Beneficiary Survey. Several policy issues related to mental illness, nursing facilities, and Medicare policy suggest that further study of the relationship between mental illness and use of nursing facilities is warranted.

First, rapidly rising Medicaid expenditures which strained government budgets and the de-institutionalization of persons in state mental health facilities raised the possibility that persons with a mental illness were being inappropriately placed in nursing facilities to gain federal matching payments. Recent legislative initiatives, notably the Nursing Home Reform Act, had led to the implementation of a screening mechanism to ensure that persons with a mental illness and no functional limitations were not placed in nursing facilities. At this time, however, little is known about the impact of mental illness on the use of nursing facilities.

Second, research indicated that a significant number of nursing facility residents did have some mental illness. The vast majority, however, were not receiving ongoing mental health treatment. This failure to meet the psychosocial needs of nursing facility residents also was behind provisions of the Nursing Home Reform Act, which hoped to improve the quality of nursing facility care. In addition, Medicare payments for Part B services for mental health care had been substantially liberalized in the late 1980s and early 1990s. Thus, the issue was whether regulatory or reimbursement changes had improved mental health treatment in nursing facilities.

Third, the ongoing development in reimbursement systems suggested that cost control in post-acute and long-term care remained a problem. Medicare skilled nursing facility and home health payments, for example, rose 33 percent from 1990 to 1995. Reports from the Prospective Payment Assessment Commission (PROPAC) indicated that little research had been done on the determinants of total costs of episodes in skilled nursing facility or home health settings. Furthermore, PROPAC suggested that reimbursement changes based upon prospective payments be studied and implemented. Previous research had indicated only minor impacts of mental illness and behavioral problems on per-diem costs in nursing facilities. No research had explored the impact of mental illness on annual or episodic costs.

With this background as a prelude, we estimated regression models of the impact of mental illness and related behaviors on nursing facility residents' length of stay, expenditures per day, and total annual expenditures using both the National Medical Expenditure Survey and the National Nursing Home Survey. In addition, these two data sets were used to study the impact of mental illness on discharge risks in survival models to offer an alternative view of the role of mental illness in affecting nursing facility use. Finally, the project used the Medicare Current Beneficiary Survey to examine use of Medicare Part B mental health services among both community residents and facility residents in the survey.

Our results include the following.

- From the more than 25 behaviors that were part of the nursing facility surveys, we completed a factor analysis which reduced the number of behaviors modeled to eight factors having eigenvalues greater than 1. The eight behaviors were labeled Agitated, Antisocial, Anxious, Disoriented, Forgetful, Hallucinatory, Lethargic, and Self-destructive.

- The impact of mental illness or dementia on per-diem nursing facility costs for a resident is relatively minor. The combination of mental illness and dementia raises per-diem expenditures by approximately $5 only in estimates based on the National Medical Expenditure Survey. Individually (i.e., mental illness only or dementia only), there was no significant difference in per-diem costs in either data set.

- Resident behaviors rarely had a significant impact on per-diem nursing facility expenditures; when they did, the impact was usually negative, indicating lower costs per diem for residents with these behaviors.

- In contrast, the presence of dementia only or in combination with a mental illness leads to an estimated 8 to 18 days of increased nursing facility use for residents. As a result, predicted annual nursing facility expenditures for a nursing facility resident with both dementia and mental illness are estimated to be $1,650 more than those for a nursing facility resident without these diseases. Total annual nursing facility expenditures for persons with dementia only are predicted to be $800 higher, while those for a person with mental illness only are predicted to be just $120 higher.

- Two resident behaviors (labeled agitated and lethargic) were significantly related to length of stay, although with opposite effects. Residents who were agitated averaged lengths of stay 7 to 16 days longer. Residents who were lethargic averaged lengths of stay that were 8 to 15 days shorter. In some models, residents

who were disoriented, forgetful, self-destructive, or antisocial had longer lengths of stay.

- Survival models of discharge risk, in general, support the cross-sectional regression estimates. Residents with mental illness and/or dementia have significantly lower risks of short stays (odds ratios 30% to 70% lower) and are significantly less likely to be discharged (hazard rate approximately 25% lower). In contrast, those residents who were anxious or lethargic faced a greater hazard of discharge (hazard rate 24% higher) and a greater risk of short nursing facility stays (odds ratio raised by 80% to 128%). Residents who were disoriented, agitated, self-destructive, forgetful, or antisocial sometimes had significant effects on the risk of longer nursing facility stays and lowered discharge risks.

- Estimates from the Medicare Current Beneficiary Survey still indicate that nearly two-thirds of all nursing facility residents with a mental illness received no Part B mental health treatment at all during 1992 from a psychiatrist, physician, or non-physician mental health specialist for their illness. Regression estimates continue to support prior work based on the two nursing facility data sets, suggesting that older residents and those in rural areas are less likely to receive mental health treatment. Other variables related to use of mental health services by facility residents include several physical conditions.

- Regression estimates on the community-residing sample in the Medicare Current Beneficiary Survey indicate that older persons in the community are more likely to receive some mental health treatment. Rural residents are less likely to receive some mental health treatment. Other variables that predict Medicare Part B mental health services include self-reported health status, gender, impairments in the instrumental activities of daily living, and some physical illnesses.

In summary, both medical record indications of mental illness and/or dementia are significantly related to length of stay for nursing facility residents. In addition, several resident behaviors are related to length of stay. As a result, reimbursement systems that pay on units other than per-diem costs must typically pay more for patients with these conditions. In particular, as payers for post-acute and long-term care move towards payment systems that pay for care on the basis of episodes or on a per-annum capitated payment, for example, adjustments for these diagnoses, conditions, or behaviors must be made. In general, our results indicate that on a per-annum basis, payers can expect patients with these types of conditions (except for those with lethargic or anxious behaviors) to have lengths of stay that are 8 to 18 days longer. Further research is needed to refine how diagnosis and behavior impact costs of care. In particular, better data on mental illness diagnoses and resident behaviors are needed.

Furthermore, our results on the use of Part B Medicare mental health services indicate that despite reforms in the Medicare system, many nursing facility residents, especially older residents in rural regions, do not receive care for their mental illness. While community-residing older persons do have higher levels of mental health treatment, rural residents in that sample do not. In general, very little research has been completed on the use of Part B mental health services, despite several recent reforms in that area. Further work is needed on the pattern of treatment and referral in this area, its impact on other health care costs, and its relationship to Medicare beneficiary outcomes.

INTRODUCTION

This study considers the relationship between mental illness and nursing facility use, as well as the use of Medicare Part B mental health services within nursing facilities and in the community. Three data sets are used in this research: the 1985 National Nursing Home Survey (NNHS); the 1987 National Medical Expenditure Survey, Institutional Population Component (NMES-IPC); and the 1991 and 1992 Medicare Current Beneficiary Survey (MCBS). Several policy issues related to mental illness, nursing facilities, and Medicare policy suggest that increased study of the relationship between these areas is warranted.

First, previous research has shown that a significant proportion of persons in nursing facilities have some mental illness (Goldman, Feder, and Scanlon, 1986; Smyer, Shea, and Streit, 1994; Strahan, 1990; Strahan and Burns, 1991). Debate about whether these persons have been appropriately placed is common. At least some people believe that the rise in the number of persons with a mental illness is not unrelated to the de-institutionalization of persons in state mental health facilities (Gatz and Smyer, 1992). In some sense, this represents an implicit cost shift from state payers to federal payers, since nursing facility care is partially paid for by Medicaid funds while state institutions for the mentally ill are largely supported by state funds. Recent legislative initiatives, notably the Nursing Home Reform Act of 1987 (NHRA), implemented a screening mechanism (Preadmission Screening and Annual Resident Review or PASARR) to ensure that persons with a mental illness and no functional limitations were not placed in nursing facilities (Coleman, 1991; Freiman et al., 1990). At that time, and even now, however, little is known about the impact of mental illness on the use of nursing facilities.

Second, research indicated that a significant number of nursing facility residents who did have some mental illness were not receiving adequate ongoing mental health treatment. Burns et al. (1993) showed that fewer than 5 percent of nursing facility residents in the 1985 NNHS had seen either a mental health specialist or a general physician for mental health care in the prior month. Shea, Streit, and Smyer (1994) found that even over the course of an entire nursing facility stay, fewer than one-fifth of nursing facility residents who had an indication of mental illness on their medical record had ever seen a mental health specialist. This failure to meet the psychosocial needs of nursing facility residents also was behind provisions of the NHRA to improve the quality of nursing facility care (Coleman, 1991; Lombardo, 1994).

In addition, Medicare Part B payment regulations regarding mental health care services were substantially liberalized in the late 1980s and early 1990s (Cuffel et al., 1993; Sherman, 1992). These changes raised the per-person annual limit on mental

health treatments, removed certain services (medical management of psychotropic drugs, psychotherapy, and other outpatient services) from this annual limit, and expanded the types of providers who could be independently reimbursed for services. Thus, whether regulatory or reimbursement changes had improved mental health treatment in nursing facilities (or for Medicare beneficiaries in the community) was at issue.

Third, ongoing developments in reimbursement systems suggested that cost control in post-acute and long-term care remained a problem. Medicare skilled nursing facility payments and home health payments each rose an average of almost 33 percent per annum from 1990–1995 (Prospective Payment Assessment Commission [PROPAC], 1996). Reports from PROPAC indicated that little research had been done on the determinants of total costs of episodes in skilled nursing facilities, as opposed to per-diem costs. The impact of dementia, mental illness, and behavior on per-diem costs in nursing facilities had been a controversial research subject (Aronson et al., 1992; Fries et al., 1994; Hu et al., 1986). No research had explored the impact of mental illness on annual or episodic costs. As payment systems for post-acute and long-term care begin to move towards prospective and/or capitated systems, it will become increasingly important to understand the role of factors such as dementia, mental illness, and behavior on length of stay or episodic costs.

The rest of this section of the report contains a more detailed discussion of some of the issues motivating this study. Following this, details are provided on the data and methods used in the analyses. In the Discussion section, the findings are reported on. The Conclusion section contains a summary of research results.

Mental Illness and Nursing Facility Resource Utilization

Although nursing facilities are frequently used by persons with mental illness, there has been little empirical work modeling the effects of mental illness on this utilization. This deficiency persists despite descriptive evidence that mental illness is an important determinant of resource utilization, increasing length of stay for nursing facility residents with mental illness compared to those without mental illness (Strahan, 1990).

The effects of mental illness on nursing facility length of stay, annual costs, or episode costs, as opposed to per-diem costs, remain relatively unaddressed in the literature. Payment systems like Resource Utilization Groups (RUGs) account for behaviors related to mental illness in the case-mix measure (Fries et al., 1993). Empirical models of the impact of mental illness on nursing facility utilization measures such as length of stay and total expenditures, however, are few in number (Shea, Streit, and Smyer, 1994). Empirical modeling is complicated by potential confounds peculiar to nursing facility studies. For example, in attempting to explain variance in nursing

facility resource utilization attributable to mental illness, diagnostic accuracy bias, comorbidity, activities of daily living (ADL) deficits correlated with mental illness, and cohort membership (e.g., admissions versus current residents) must be considered (Aronson et al., 1992; Fries et al., 1993; Hu et al., 1986).

Current reimbursement systems such as RUGs and their recent variations attempt to account for utilization attributable to the management of mental illness sequelae directly impacting staff time per day. Fries et al. (1994) use ADL dependency as the primary explanation for increased resource utilization among nursing facility residents with severe dementia. Costs per day under the latest RUGs version are adjusted for ADL deficits and some behavioral impairments, but advocates for mentally ill nursing facility residents believe that reimbursement systems should make further adjustments for diagnostic categories and behavioral disturbances associated with these categories (Aronson et al., 1992; Fries et al., 1994). Compounding the problem of adjustment for behavioral disorders is a lack of consensus on how to organize individual behaviors into clinically meaningful groups.

Policy makers interested in reformulating reimbursement to long-term care facilities serving persons with mental illness confront difficult questions. Issues such as equity across case-mix reimbursement methods and appropriate levels of capitation in prepayment proposals must be addressed from the perspectives of stakeholders with diverse interests. Since post-acute care systems are moving towards prospective and/or capitated solutions to cost containment, we are particularly interested in the effects of mental illness and associated behavior disorders on length of stay and total expenditures per year.

Treatment of Mental Illness in Nursing Facilities

Despite the fact that much evidence indicates many nursing facility residents have important untreated mental illnesses, most studies suggest few residents receive appropriate treatment. The 1987 NHRA, part of the Omnibus Budget Reconciliation Act of the same year (OBRA87), was intended to remedy this problem by mandating that residents receive treatment consistent with achieving the highest practicable level of psychosocial well-being. Nearly a decade after the passage of this legislation, important questions about the quality of mental health care in nursing facilities persist.

One purpose of this project is to examine the receipt of mental health treatment by persons with a mental illness residing in nursing facilities in 1992, five years after the NHRA was passed. Previous studies of mental health treatment in the nursing facility relied on the 1985 NNHS and the 1987 NMES, both of which cover periods prior to the federal mandate for quality mental health care in nursing facilities. While some studies of post-reform care in nursing facilities exist, no study has been completed using a nationally representative sample of persons. Data on nursing facility residents in

the next round of the NNHS and the NMES will not be available until later in this decade. Thus, this project represents the first study of mental health treatment in nursing facilities using nationally representative data after the major reforms of the later 1980s.

The needs of the chronically mentally ill residing in nursing facilities are well-documented. Newman et al. (1989) found that although 91.2 percent of their sample of 828 nursing facility residents had sufficiently high levels of medical and physical care needs to justify nursing facility placement, 79.6 percent also had moderate to intense needs for mental health care. Similarly, Heston et al. (1992) found 868 residents with physician-diagnosed major depression in their admission cohort of 5,752 residents aged 65 or older in 1976 through 1983 who resided in Medicaid/Medicare certified nursing facilities. The authors concluded that for this sample of institutionalized depressed elderly, appropriate treatment was uncommon and patients were typically untreated, undertreated, or treated with medications contraindicated for depression. German et al. (1992) found 80 percent of their sample of 454 admissions to eight nursing facilities had mental illness, 60 percent of this being dementia, with 50 percent of these patients with dementia also having other complicating mental illness. Newman et al. (1989) reported that 79.6 percent of their sample of 828 nursing facility residents had moderate to intense needs for mental health treatment. Similarly, Burns and Taube (1990) and Phillips and Hawes (1992) documented the psychosocial needs of nursing facility residents.

Data from the 1977 NNHS indicated that more than 350,000 nursing facility residents had a primary or secondary mental illness diagnosis (Goldman et al., 1986). More recent data from the 1985 NNHS and the 1987 NMES show that 300,000 to 500,000 nursing facility residents had a primary mental illness diagnosis (Shea et al., 1993; Strahan, 1991).

The 1986 Institute of Medicine report clearly described the lack of good quality care in nursing facilities, making it one of the main portions of their study (Institute of Medicine, 1986). Subsequent research shows that few nursing facility residents with a mental illness receive care. Burns et al. (1993), for example, found that fewer than 3 percent of persons with a mental illness diagnosis had received treatment by a mental health specialist in the previous month; only a slightly higher percentage of residents had seen a general practitioner for some mental health treatment. In combination, fewer than 5 percent of nursing facility residents with a mental illness had been treated for that illness. Shea et al. (1994) and Smyer et al. (1994) also showed low levels of treatment in nursing facilities with the NMES. These studies indicated that fewer than 20 percent of nursing facility residents with a mental illness had ever received treatment for that illness during their nursing facility stay. In both utilization studies, there was a clear indication that age was associated with lower probability of treatment.

Bienenfeld and Wheeler (1989) previously reported manpower deficiencies in the mental health care delivery system within nursing facilities. Grossberg et al. (1990) discussed the need for psychiatric consultations in nursing facilities, citing recent literature on the prevalence of mental illness in these facilities. They believed that while psychiatric or psychological services are available in nursing facilities, the needs of chronically mentally ill residents remain largely unmet.

The 1987 NHRA has as one of its intents the improvement of quality in nursing facilities. In particular, it requires these facilities to provide services that help residents maintain the highest practicable level of well-being, including psychosocial well-being. Implementation of this legislation has been slow, however, as providers object to the many costs of the mandate (Migdail, 1992). Lombardo (1994) and Cuffel (1994) further detail the many remaining barriers to mental health services for nursing facility residents, including low reimbursement rates, scarcity of mental health providers, and resistance among providers to seeing nursing facility residents at the facility. The slow implementation and the remaining barriers to quality mental health care in nursing facilities suggest that many residents still may not be receiving services. Cuffel et al. (1994) identified the institutional and financial barriers to funding mental health and long-term care. Their review of preliminary studies indicated that the 1987 NHRA might result in some de-institutionalization of younger, chronically mentally ill nursing facility residents

Lombardo (1994) indicated that despite the OBRA87 legislation, the prevalence of mental disorders among nursing facility residents remains high, and the benefits of mental health services for these residents have yet to be realized. Services tailored to the needs of mentally ill nursing facility residents are still scarce, and barriers to this care remain rooted in policy and reimbursement problems, possibly exacerbated unintentionally by the Nursing Home Reform Act. Nursing facility administrators still report difficulties attracting geriatric psychiatrists, psychologists, and other qualified mental health professionals. Psychiatrists indicate that low reimbursement levels deter them from providing more services to nursing facility residents. Medicare and Medicaid reimbursement rates remain low relative to private sector reimbursement and the time expended for specific services. Medicare and Medicaid reimbursement and coverage rules further limit access to some mental health services. Although the potential pool of providers was expanded in recent years, only 25 percent of the facilities surveyed in Lombardo's report to the American Association of Retired Persons (AARP) had a psychologist and/or psychiatric social worker on staff or under contract (Lombardo, 1994). Lombardo addressed the impact of NHRA from the perspective of nursing facility administrators, directors of nursing, and geriatric psychiatrists, but did not collect data on treatment. This project represents the first study to examine mental health treatment in a nationally representative survey of nursing facility residents after OBRA87.

Medicare and Mental Health Treatment

Medicare, as a program structured to finance acute care for the elderly and disabled, provides beneficiaries with reimbursed care for physical conditions but is more restrictive in terms of psychiatric benefits (Cuffel et al., 1993; Sherman, 1992). Differentials in payment between medical and mental health services under Medicare persist despite policy changes since the late 1980s (Koenig, 1994; Sherman, 1992). Higher cost-sharing for outpatient mental health services and complex coverage rules are believed to be responsible for the continued underutilization of Medicare-covered mental health services by beneficiaries (Sherman, 1992). Additionally, reduced reimbursement rates to mental health specialty providers have impacted the site of services delivery, shifting some of the burden for mental health care to the general medical sector (Gatz and Smyer, 1992; Koenig et al., 1994; Reiger et al., 1993; Schurman et al., 1985). The potential for cost inefficiencies and decreased treatment effectiveness under this de facto system of mental health care delivery continues to be discussed in the literature (Koenig et al., 1994; Reiger et al., 1993).

In addition to the changes embodied in the 1987 NHRA, Medicare coverage of mental health benefits has improved in recent years. OBRA87 expanded the initial limit of $250 per person annually for mental health treatment to $1,100 and removed the medical management of psychotropic drugs from this maximum limit while reducing the coinsurance level to 20 percent for this service; coinsurance for other mental health treatments remained at 50 percent (Sherman, 1992). Further modifications to Medicare policy were made in 1989, when psychotherapy and other outpatient services were removed from the maximum payment limit, and psychologists and clinical social workers were permitted to be reimbursed directly for services (Sherman, 1992). In 1988, 2.5 million visits to psychiatric providers were made by Medicare beneficiaries, but an estimate of how many of these were for nursing facility residents is not available (Sherman, 1992).

In fact, there are few studies of the use of Medicare's mental health benefits at all. Obviously, it is important to identify whether these changes are having an impact on mental health treatment in nursing facilities. So far, however, there has been little evaluation of the impact of these changes. The few studies that have examined the issue have not focused on Medicare's mental health benefits.

Research findings on the price sensitivity of outpatient mental health services indicate an inverse relationship between increased cost-sharing for outpatient mental health services and annual expenditure amounts (Manning et al., 1986). While the overall level of expenditures due to the use of outpatient mental health services remains low (Manning et al., 1986), the cost burden of mental illness on individuals and society remains substantial (Rice et al., 1992). Whether the policy strategy of increased cost-sharing for outpatient mental health services has resulted in decreased health care

expenditures systemwide has been questioned in the literature (Goldstein and Horgan, 1988; Goodman, 1989).

The utilization profile of persons with mental and emotional disorders that has been developed from many studies presents a picture of relatively high use of ambulatory health care services among a small proportion of the mentally ill population, care-seeking through primary providers and the de facto mental health system, and age differentials in the use of specialty mental health services (Narrow et al., 1993; Reiger et al., 1993; Steinwachs et al., 1992; Taube et al., 1986; Wells et al., 1986). Taube et al. (1986) model the probability and level of ambulatory mental health service use in their examination of 1980 household medical expenditure data. They found increased age, private insurance, Medicaid, poorer health status, and the presence of physical conditions to be associated with increased probability of use. Higher education and increased income are associated with the level of use among those who use ambulatory mental health services. Similar findings on level of use were described by Wells et al. (1986).

Based on estimates from the Epidemiologic Catchment Area Survey, less than 30 percent of those with mental disorders sought mental health or addictive care services and close to 15 percent of the U.S. population sought care through the de facto mental health service system (Reiger et al., 1993). In a separate study using the same data, Narrow et al. (1993) found that many persons were seen in the general medical sector but the frequency of visits was lower than the average of 14 visits found among those treated in the mental and addictive care service sector.

The age differentials in use are evident in the work of Steinwachs et al. (1992). Using National Alliance for the Mentally Ill survey data and contingency analysis, they found that the mean number of mental health visits decreased with increased age and that males had fewer visits than females.

While prevalence of mental illness among the elderly is not high, the growth of the elderly population implies increased numbers of mentally ill persons. The baby boom cohort, whose prevalence of mental disorders is already high by age group comparison, poses additional challenges for the Medicare system (Reigh et al., 1993). Although the overall picture of access and health has improved for the elderly and other Medicare beneficiaries, little study of Medicare's mental health services has been undertaken.

Data and Methods for the National Medical Expenditure Survey

We used data from the Institutional Population Component (IPC) of the 1987 NMES. The sampling frame for nursing facilities included in the NMES-IPC is the 1986 Inventory of Long-Term Care Places (Edwards and Edwards, 1990). We

completed our analysis using three different versions of the NMES-IPC resident sample. One group consisted of the NMES-IPC "current residents" cohort of patients already residing in a sampled facility as of January 1, 1987, who did not have a subsequent discharge and readmission to a sampled facility. We call this group the Partial Current Resident Group. A second group consisted of all current residents in a sampled facility as of January 1, 1987, regardless of whether or not they had a subsequent discharge and readmission. This group we called the Full Current Resident Group. Finally, we had a third group consisting of all persons in the NMES-IPC who had at least one nursing facility admission during 1987. Thus, this group included current residents in a sampled facility as of January 1, 1987, who later in the year had a subsequent admission to a sampled facility, as well as those who were not in a sampled facility on January 1, 1987 and had a nursing facility admission. We called this group the Admission Group (see Garrard et al. [1993] for a discussion of some of the differences between these groups). Tables 1–6 provide descriptive statistics on the variables described below for the three groups.

Variables and measures—The conceptual model used in most of this study is due to Aday and Andersen (1974, 1975) and Andersen and Aday (1978), in which utilization behavior is predicted by characteristics of the health care delivery system as well as characteristics of the population at risk. We categorized independent variables into the following sets: (a) delivery system (facility-level) descriptors; (b) individual-level predisposing characteristics; (c) individual-level enabling characteristics; and (d) individual-level "need" variables used as indicators of illness and functional limitations.

Basic facility-level descriptors from the NMES-IPC included ownership, affiliation, size, whether or not the nursing facility was a hospital unit, whether or not the home had a waiting list, certification status, and whether or not the facility offered specified medical, rehabilitative, or counseling services.

Predisposing characteristics of residents included age, sex, and race. Additionally, correlates of social support (marital status, presence of living siblings, and presence of living children) also were used as control variables.

Individual factors enabling utilization were type of insurance coverage, income category, and educational level. Related categorical and continuous variables were type of residence immediately prior to the current nursing facility placement and total number of months of residence in any institution continuous with January 1, 1987, respectively.

Need variables included dummy indicators of physical illness for cardiovascular diseases, arthritic conditions, cancer, diabetes, coma, and 'other' conditions (autism, cerebral palsy, emphysema, epilepsy, spina bifida, and mental retardation), as indicated in patients' medical records. Additional dummy variables for physical difficulties

associated in the literature with increased expenditures included whether or not subjects had problems with bedsores, constipation, obesity, being underweight, or medication side effects. A final ordinal-level control variable was a ten-point scale of functional limitations. We constructed this scale using the six ADL variables in the NMES-IPC. Greater ADL deficits were indicated by higher scale scores. We did not include in this scale IADL measures from the NMES-IPC because these measures are considered inapplicable to the institutionalized persons surveyed in the NMES-IPC.

Independent measures of need central to our study included a categorical variable for the report of a mental illness in the medical record and additional indicators of behavioral disturbance. We created the diagnostic variable by recoding the seven mental disorders recorded in subjects' medical records into four broad diagnostic categories. The original disorders included senile dementia, depressive disorders, schizophrenia, other psychoses, anxiety disorders, personality disorders, and other mental disorders. The categories of the created variable are (a) dementia and mental illness; (b) dementia only; (c) mental illness only; and (d) neither dementia nor mental illness (the reference category in the regression models) (Lair and Lefkowitz, 1990).

The choice of this four-level variable was made upon consideration of what past research has shown about diagnostic and medical record accuracy in nursing facility surveys. Research (Rovner et al., 1991; Schmidt et al., 1987) indicates that both ICD-9 codes and medical record reports contain significant errors. In particular, the ICD-9 codes are typically reported to underestimate the number of residents with a mental illness (Rovner et al., 1991). Thus, we made an initial decision to use the medical record reports as somewhat more reflective of the prevalence of mental illness in nursing facilities. Lacking any specific diagnostic test for the particular mental illnesses in the data, however, we decided to collapse the seven questions into the four categories to prevent misplaced specificity. In addition, many of the categories still have small sample sizes and would have to be combined to have any power to detect an effect. This may lead to effects of one type of mental illness offsetting another, implying no effect when there is one present. Certainly, as more research is done more specific categorizations must be completed. We think our method balances the need for statistical power and the quality of the clinical data in a manner which improves our understanding of the issues, if it does not attain the ideal.

The NMES-IPC contains 29 variables for behavioral disturbances we considered potential correlates of mental illness. Using all of the NMES-IPC respondents, we subjected these dichotomously coded variables to principal components factor analysis with varimax rotation and limited factor extraction to the eight factors with eigenvalues greater than 1.0. These factors accounted for 56 percent of the variance in the behavioral variables (greater detail on the factor analysis is provided in the Discussion below). All factors were defined by at least two behaviors with significant loadings. Based on the variable loadings, we defined the factors as Agitated, Antisocial, Anxious,

Disoriented, Forgetful, Hallucinatory, Lethargic, and Self-destructive. We conducted a reliability analysis of these factors for the current residents cohort. We then created eight dummy variables (one for each factor) for use in three subsequent regression models. For each of these dummies, a value of 1 indicated a subject had at least one of the behaviors falling into that factor; otherwise, we assigned a value of 0. In some results the Disoriented factor was omitted because it was nearly collinear with the mental illness indicator of dementia.

Dependent measures included length of stay (the total number of stay days for a subject in any sampled facility in 1987), total expenditures for 1987 (the sum of 'total basic' and 'total ancillary' expenses indicated in the NMES-IPC Expenditures File), and expenditures per day (total expenditures divided by length of stay). In order to hierarchically model the impact of mental illness and behavioral disturbances resource utilization, we constructed three ordinary least squares regression models for each of the dependent measures. Sequentially, these models were (a) Model 1, control variables only; (b) Model 2, control variables plus the eight dummy variables representing the factors; and (c) Model 3, the full model containing all of the independent variables, including the diagnostic indicator. With the addition of each set of variables in the latter two models, the null hypothesis that the true population value for the change in R^2 is 0 was tested using the F_{change} statistic.

Data and Methods for the Medicare Current Beneficiary Survey

This study also uses data from the 1991 and 1992 MCBS. The MCBS is a panel survey which includes self-report, administrative data, and claims history information for a representative sample of the Medicare population. The survey is conducted through a contract with Westat, Inc., by the Office of the Actuary, Health Care Financing Administration (HCFA). The Medicare enrollment file constitutes the sampling frame from which potential respondents to the MCBS are selected. The sampling methodology of the MCBS is intended to ensure the representativeness of the Medicare population as a whole, and by age group (Adler, 1994).

Individuals in the MCBS are interviewed three times a year over several years to form a continuous profile of their health care experience. Baseline information is collected in the first interview with the sample person (or designated proxy) and updated annually. Field work for Round 1 was conducted during the fourth quarter of 1991. New rounds begin every four months and interviews are conducted whether the sample person resides at home or in a long-term care facility. Medicare claims data are included to provide accurate data on Medicare-covered services used. Survey information gained in Rounds 1 and 4, representing data collected in 1991 and 1992, are used in this study. There are 12,677 individuals included in the MCBS. Of this number, 11,735 individuals are non-institutionalized. After excluding those under age 65 and missing data, we had a sample of 9,717 persons residing in the community and

732 persons residing in institutions. These individuals comprised the analytic set for this study. Once again, variables were organized using the Aday and Andersen framework. Descriptive data on the variables described below are provided in Tables 7–10.

Variables and measures—The presence of a mental illness is defined through the self-reported presence of mental illness, combined with HCFA survey data indicating Medicare eligibility as a result of having a mental illness. The dummy coded variable indicates the presence or absence of self-reported mental illness and/or eligibility due to mental illness. The reference group is persons without mental illness.

Need variables other than the presence of mental illness are used as control variables in this study. They are health status, ADLs, IADLs, and physical conditions. Health status was reported as excellent, very good, good, fair, or poor by survey respondents in the MCBS. In this study, three health status dummy variables were defined. The excellent and very good groups, and the fair and poor groups were combined to make two variables, excellent and poor. The third dummy variable is good health. The reference group is those in the excellent health group.

There are six dummy variables indicating the presence or absence of limitation in ADLs. Survey respondents indicated whether they needed help with bathing, toileting, dressing, eating, transferring to a chair, and walking. The six dummy variables indicating problems with IADLs—problems with light housework, heavy housework, preparing meals, shopping, using the telephone, and managing money—also are used as controls. Data on housework and meals are not collected for the institutional residents.

The MCBS records information about the presence or absence of specific physical conditions. Fifteen specific indicators were combined into nine physical condition dummy variables for use in these analyses. The following are used as control variables: presence of a heart condition, cancer, high blood pressure, stroke or hardening of the arteries, diabetes, arthritis, osteoporosis, paralysis or amputation, or asthma, emphysema, or chronic obstructive pulmonary disease.

The predisposing variables included in this study are education, gender, marital status, ethnicity, age, number of living children, and household composition. Five dummy variables were constructed to capture level of education. The reference category is 0–8 years of education. The included variables indicate the respondent does not know his/her education level, has 9–11 years, 12 years, or education beyond high school. Dummy variables indicating male gender, white race, marital status, Hispanic ethnicity, and living with others who are non-relatives are used. Age as of July 1, 1991, and the number of living children are entered as continuous variables in the models.

Enabling factors include income, insurance status, location of residence, and whether or not the sample person lived with another person for community residents. Income was coded as a dichotomous indicator for those below $25,000 in annual income. Insurance categories include Medicare only as the reference group, employer- and individual-purchased supplemental insurance, and Medicaid. Insurance variables other than Medicaid are not available for institutional residents and were not used. A dummy variable indicating metropolitan location is used.

The dependent variable for the MCBS study was defined to be mental health visits. Medicare Part B administrative claims records were searched to identify claims for services provided by mental health specialists (psychiatrists, clinical psychologists, licensed clinical social workers) and other physicians. Health Care Procedural Coding System (HCPCS) codes and dates of service provision were used to identify mental health visits distinct from other health care visits and within visit services (e.g., tests or procedures that might have been given during a mental health visit). Visits were divided into total visits, visits to mental health specialists, and visits to non-mental health specialists.

Aday and Andersen's (1974, 1975) and Andersen and Aday's (1978) conceptual model of health services utilization is used in the analyses of data from the MCBS 1991 and 1992. The conceptual model relates characteristics of the population at risk and of the service delivery system to the utilization of services. Predictive variables described above were drawn from 1991 data (collected in the last quarter of 1991) and utilization measures are acquired from 1992 data.

Two-part modeling is used in the analysis (Duan et al., 1982). In part one, the probability of any mental health visits is modeled for community and institutional residents. Logistic regression is used in part one models. Part two models include only users of care and estimate the log of the number of mental health visits using ordinary least squares regression.

Data and Methods for the National Nursing Home Survey

The NNHS is a stratified two-stage sample of nursing facility residents. The first stage is the sample of facilities based upon a sampling frame from the 1982 National Master Facility Inventory (NMFI) and nursing facilities opened for business from 1982 to June 1984 and identified by the NCHS Agency Reporting System, and hospital-based nursing facilities identified in HCFA records. The second stage is a selection of residents from the sample facilities. The sample frame for residents was the total number of residents on the register of the facility on the evening prior to the day of the survey (NCHS, 1992). In our research we use the sample of current residents in the facility on the survey date as our subject of study. This group totals 4,646 nursing

facility residents. Descriptive data on the variables described below for these residents are given in Tables 11 and 12.

Variables and measures—As in the prior sections, variables were categorized as facility-level descriptors, individual-level predisposing characteristics, individual-level enabling characteristics, and measures of need, categorized by physical illness, mental illness, behavioral disorders, and functional limitations.

Facility characteristics were drawn from the NNHS facility questionnaire. These variables included indicators of whether the facility provided mental health services or rehabilitation services, reimbursement eligibility in terms of being certified as an Intermediate Care Facility, Skilled Nursing Facility by Medicare, or a Skilled Nursing Facility by Medicaid, and whether the facility included any non-certified beds. Other facility characteristics included whether or not the facility was part of a chain of facilities, and categorical variables indicating facility size in terms of number of resident beds (under 50 beds, 50 to 99 beds, 100 to 199 beds, and 200 or more beds). Facility ownership, as proprietary or not, also was coded.

The four facility certification variables were all created from a question in the facility questionnaire which represented a recoding of reimbursement eligibility. Because facilities could have multiple certifications, categories in this recoded variable could indicate combinations of reimbursement eligibility. For this reason, the four constructed variables are overlapping rather than mutually exclusive (i.e., it is possible to have certification for all three, and still have some uncertified facility beds).

Predisposing variables included in the analyses were derived from information in the current resident (CR) questionnaire from the NNHS. Age was taken directly from the CR questionnaire. Gender was a dummy variable initially set to 1 for female. A dummy variable denoting white versus non-white status was used. Marital status was a variable indicating whether the resident currently had a spouse. Finally, a dummy variable indicated whether or not the resident had any living children.

Information was available in the CR file on where residents were admitted from, and past institutionalization history. A variable was created to indicate whether or not the resident was living in a rehabilitation hospital prior to admission. If the resident was a previous resident of a psychiatric facility, a second variable was set to 1. If the resident was a previous resident of a nursing facility, either the current facility or another one, a dummy variable was set to 1 and was otherwise assigned a value of 0. Finally, if the person was previously a resident of a facility for the mentally retarded, a variable was assigned a value of 1; otherwise, it was set to 0.

The immediate prior location before nursing facility admission is indicated with three dummy variables. One dummy variable indicates whether the resident was

admitted to the current facility directly from another nursing facility. If the resident was admitted directly from the hospital, then a second dummy variable was assigned a value of 1; otherwise, it was 0. Finally, if the resident was admitted directly from any other type of facility, then a third dummy variable was set to 1; else, it was 0. The excluded category was living in the community prior to admission.

Three variables, each reflecting a payment source for nursing facility services, were considered as enabling factors affecting the potential for medical care utilization. Medicaid was set to 1 if any part of the resident's expenses during the month of admission were covered by Medicaid for Skilled Nursing Care or Intermediate Nursing Care. Similarly, a dummy variable indicated the use of other public (Medicare, state-funded indigent care, Veterans Administration, or other government assistance) reimbursement sources during the admission month. A final variable indicated payment, during the admission month, by private insurance or own income.

Seven indicators of physical illness were considered. Each was assigned a value of 1 if the diagnosis record indicated a current diagnosis of that illness. The conditions included were arthritis, decubitus ulcers, cancer, cardiovascular disease (including stroke), constipation, diabetes, and other non-mental health diagnoses. Because up to eight current diagnoses could be coded, these indicators of need due to physical illnesses are not mutually exclusive.

Development of mental illness indicators of need was accomplished in a three-step process, in the same fashion as in the NMES-IPC. First, three diagnostic categories for mental illness were created. A diagnostic category of dementia or other organic brain syndrome was created if the resident's medical record or diagnosis indicator indicated the presence of senile dementia or organic brain syndrome. Similarly, the presence of any mental illness was used to create a second variable if schizophrenia, other mental illness, alcohol abuse or dependence, drug abuse or dependence, depressive disorders, anxiety disorders, personality or character disorders, or other mental disorders were indicated in the diagnostic record or the medical record.

Second, the four-part categorical variable was created (Lair and Lefkowitz, 1990). Using these variables, three new dummy variables were created, with no mental illness as the reference category, for those with dementia and a mental illness, those with dementia only, and those with a mental illness only.

Based upon the factor analysis of behavioral problems conducted with the NMES-IPC data set, a set of six indicators of behavioral disorders was constructed to correspond as closely as possible with the previous analyses. Forgetful was assigned a value of 1 if the resident was unable to recall important events, unable to remember dates and times, unable to make judgments, or got lost. Agitated was assigned a value of 1 if the resident was physically abusive or screamed. Anxious was assigned a value

of 1 if the resident displayed fearfulness or worry, depression, or anxiety. Disoriented was set to 1 if the resident was unable to remember locations. Antisocial was set equal to 1 if the resident stole things. Self-destructive was set to 1 if the resident was unable to avoid simple dangers or exposed him- or herself.

The NNHS includes information on six personal ADLs: bathing, transferring out of bed, dressing, eating, toileting, and walking. For transferring, toileting, and feeding, it was possible to create a three-level variable where 0 indicated no difficulty with the task, 1 indicated that the resident could perform the activity with assistance, and 2 indicated that the resident could not perform the activity at all. For walking, bathing, and dressing, it was only possible to create a dichotomous variable where 0 indicated no difficulty with the task, and 1 indicated difficulty. Total ADL impairment was reflected in the sum of all six ADL variables, which because of the scaling for ADLs ranges between 0 and 9.

Several dependent variables were created with the NNHS data. The first, created to offer a comparison to the NMES-IPC data, is a continuous variable indicating the total number of days in the year prior to the interview that the resident was in a nursing facility. The date is calculated by counting backwards through all listed stays until a year prior to interview was reached. For this reason, the total number of stay days ranges from 1 to 365. In some analyses, the logarithm of this variable is used to control for non-normality in the distribution of this variable. A second variable counts the number of stay days in the month prior to the interview. A third variable was total length of current stay which was obtained directly from the current resident file. Total expenditures for the month prior to interview are taken directly from the current resident file. The per-diem cost is the ratio of total expenditures for the prior month to the length of stay in the prior month. In some analyses the logarithm of expenditures and per-diem costs were used. Finally, for some analyses, a dummy variable is used if the resident was in the nursing facility for the 365 days prior to the interview. In the following discussion only a subset of the results is presented since they largely tend to reflect similar findings.

As with the NMES-IPC, ordinary least squares regressions are run (in this case no hierarchical model was employed) using the various dependent variables and the facility, predisposing, enabling, and need explanatory variables. For the dichotomous length of stay indicator, a logistic regression was run.

Alternative Models of Nursing Facility Use

Using both the NMES-IPC and the NNHS, the project also attempted some exploratory modeling of nursing facility use employing multinomial logit and survival function modeling. These models could add support to the prior analyses. They also

could allow us to examine the time dependence of events like discharge and adjust for censoring in the data.

Using the NMES-IPC we examined a multinomial logit model of length of stay where nursing facility stays were divided into long stays (greater than 90 days), short stays ending in discharge, and short stays ending in death. The sample for this study is the admissions cohort of the Institutional Population Component (IPC) of the 1987 National Medical Expenditure Survey (NMES). This cohort (N = 1,991, following the exclusion of 11 of 2,002 available cases due to missing data on at least one covariate) is a nationally representative sample of nursing facility patients admitted during 1987 who were not current residents as of January 1, 1987 (Cunningham, Short, and Feinleib, 1995). The sampling frame for nursing facilities included in the NMES-IPC is the 1986 Inventory of Long-Term Care Places (Edwards and Edwards, 1990).

We restricted our analyses to the admissions cohort in order to minimize the problem of left censoring in the NMES-IPC. Hazard models do not efficiently accommodate left-censored cases (Luke, 1993). In the present study, left-censored cases are patients with nursing facility use prior to 1987, for whom the timing of this use is unknown. While the NMES-IPC includes a reconstruction of up to five stays previous to January 1, 1987 for each patient, the data set does not include complete information on the timing of state changes for all patients. Furthermore, the NMES-IPC contains time-independent covariates collected for the 1987 survey. We cannot assume that the values of these covariates are valid for the years covering stays prior to January 1, 1987. For example, a patient diagnosed with dementia in the 1987 NMES-IPC who used a nursing facility in 1985 may not have had signs or symptoms of this disorder in 1985.

With respect to nursing facility admissions for 1987, only the admissions cohort (compared to the two other cohorts of the NMES-IPC) is homogenous with respect to the time-dependent process of nursing facility entry and exit for 1987. We defined the beginning of patients' 1987 nursing facility experience as their admission date recorded in the NMES-IPC. This is an important point to make, in that the correct interpretation of our results is limited to the single-year experience of the cohort. We enriched our interpretation by including a prior nursing facility use variable available in the NMES-IPC (a dummy without transition timing information). This relaxed interpretive restrictions somewhat in that effects of mental illness on 1987 transitions could be adjusted for prior nursing facility experience.

From a policy perspective, this limitation in the data may not be too restrictive. Risk adjustment formulae can still be constructed based on single-year experiences of cohorts such as the one used in this study, since all of the timing and duration information for the entire year is available. However, risk adjustment needs to be tempered by the possibility of duration dependence between stays prior to 1987 and

stays during 1987, a dependence not fully captured by dummy lifetime institutional use covariates. Another and less technical way of saying this is that the models used in our study do not fully capture admission cohort members' previous experiences with the process of nursing facility utilization.

Another drawback of the current (public use) version of the NMES-IPC is that patient location following discharge is not fully known. This precludes modeling discharge by location (e.g., discharge to personal care facility, discharge to own home, etc.). Therefore, the states available for our model were either "residing in nursing facility," "dead" (if a patient's date of death was the same as her date of discharge or within seven days from her date of discharge), or "alive in community" (which included all locations other than nursing facilities). The three states are considered jointly in a state space. The competing risks approach, in our opinion, is essential to longitudinal nursing facility resource utilization studies because patients discharged dead are obviously no longer at risk for subsequent readmissions to nursing facilities.

In our analysis we equated a complete nursing facility stay with the NMES-IPC definition of an episode of nursing facility use. An episode is a continuous period of residence in a home, even if it includes multiple (essentially continuous) stays which are only separated by short-term hospital stays (Cunningham, Short, and Feinleib, 1995). This definition avoids overcounting short-stay patients (alternatively, overcounting admissions and discharges). This use of the term episode also coincides with its conventional meaning in event history analysis, where an episode or spell equals the period of time between successive events (Blossfeld, Hamerle, and Mayer, 1989). An episode in our single spell model is thus first 1987 nursing facility stay in days. Stay in days is the dependent variable in our model and, in combination with a censoring variable indicating whether or not a discharge occurred and what type of discharge occurred, an unobserved dependent variable, the hazard rate was defined by the computer program.

For analyses using the NNHS, four dependent variables were created using the available information on length of time until death or discharge. The first, "First Stay," reflects the time in days from the baseline interview until the first known discharge. "Last Stay" reflects the days from baseline interview until the last known date of contact. "All Stay 1" is the sum of "First Stay" and the resident's current length of stay at the time of baseline interview, and thus reflects the entire duration of that stay. "All Stay 2" is the sum of "Last Stay" and the resident's current length of stay at the time of baseline interview.

In order to determine the most appropriate survival analysis model for each of the dependent variables, a variety of parametric and semi-parametric models were examined. Comparison of the log-likelihood for each of the parametric models indicated that a Weibull model was appropriate for only one of the outcomes of interest, relative

to the generalized gamma model. For this reason, Cox regression, necessarily performed using unweighted data, was selected as the preferred model for all analyses. Comparison of the estimated hazard ratios between the Weibull and proportional hazards models indicated that the models provided nearly identical estimates. Tied data in the Cox regressions were handled using the exact method, and yielded results virtually identical to the Breslow and Efron methods.

Once the risk of discharge due to any reason had successfully been modeled, we examined the competing risks of discharge versus death. To accomplish this, a pair of Cox regression models was compared with the model describing discharge due to any reason for the "All Stay 1" variable.

Nursing Facility Resident Behaviors: A Factor Analysis

Tables 13–15 present the results of the factor analysis on the 29 behaviors in the NMES-IPC data set. For the results below, we use only the Partial Current Resident sample. The bold print in Table 14 indicates into which factor each behavior fell. For example, the five behavioral disturbances found in the sample (recognizing oneself, recognizing staff, knowing where you are, socializing with family, and socializing with friends), are all contained in Factor 2, Disoriented. We retained assignment of inappropriate dressing behavior to Factor 5 based strictly on the factor loading results, even though the factor loadings were .48 for Factor 5 and .40 for Factor 6. All other behaviors clearly loaded into a single factor.

As described above, dummy variables were created based upon the eight factors. A resident was assigned a value of 1 if they had any of the behaviors included in that factor. The proportions of the current resident sample in the NMES-IPC with each factor is shown in Table 15. The Disoriented and Forgetful factors are most prevalent, as might be expected for a cohort of current nursing facility residents.

To examine the relationship between the factors and the medical record indication, a cross-tabulation was run of the factors from the factor analysis by the presence of mental illnesses recorded on the medical record. These are shown in Table 16. Some strong connections are shown between reported behaviors and recorded diseases. For example, nearly 90 percent of those with senile dementia are recorded as having one of the Forgetful behaviors, while only 52 percent of those without a record of senile dementia have this factor. Those with depressive disorders indicated in the record are no different from those without depressive disorders in the behavioral dimensions of Forgetful or Disoriented, but are in Anxious and Lethargic behaviors.

Regression results to test the improvement in model fit are found in Tables 17–19. Hierarchical regression models were run in which all other independent variables were included first. The behavioral factors were then entered, followed by the indicators of mental illness from the medical record. While certain behavioral and mental illness indicators appear to be useful predictors of resource utilization, the hierarchical addition of the indicators yielded only small improvements in overall model fit. For example, with length of stay as the dependent variable, the fit of the model is only slightly improved with the addition of the behavioral disorder and mental illness indicators. However, for Model 2, Agitated and Lethargic were associated with significant changes in length of stay, as reflected in either the parameter estimates or, equivalently, in the F_{change} statistic. In Model 3, having dementia only correlated

significantly with increased length of stay compared to having neither dementia nor mental illness (the reference category).

With expenditures per day as the dependent variable (Table 18), none of the coefficients for the behavioral indicators were significant when added to Model 1. In the full model, a significant decrease in expenditures per day was associated with being hallucinatory, while a significant increase in expenditures was observed for patients with dementia and mental illness, compared with the reference category.

With total expenditures for 1987 as the dependent variable (Table 19), the F_{change} statistic is significant for Models 2 and 3. In Model 2, Forgetful and Antisocial correlated with significant increases in total expenditures, while Hallucinatory and Lethargic were associated with significant decreases. In Model 3, only Hallucinatory and Lethargic remained significant, and both dementia and mental illness and dementia only are significantly associated with an increase in total expenditures.

In summary, the results from this portion of the study indicate that the many behaviors in the NMES-IPC can be reduced to eight factors reflecting resident behaviors. Except for one behavior (dressing inappropriately), the behaviors clearly load into separate factors. They appear to be reasonably interpretable and do correlate with appropriate indicators of mental illness on the medical record. Although the addition of these behaviors to models of nursing facility use do not result in dramatic improvements in overall model fit, several of the behaviors do contribute to explaining nursing facility length of stay, expenditures per day, and total expenditures.

Nursing Facility Resource Utilization, Mental Illness, and Behavior

To examine in more detail the impact of the mental illness indicators and the behavioral factors on nursing facility use, the NMES-IPC was split into the three groups described above. Full regression models were estimated using three dependent variables: total annual expenditures, expenditures per day, and total annual length of stay. Table 20 shows the descriptive relationship between selected independent variables and total expenditures, expenditures per day, and length of stay.

Differences between groups by mental illness and behavioral disorder indicators are evident. In the All Current Resident and Partial Current Resident Groups shown in the first and third columns, subjects with mental illness only have a longer mean length of stay compared with other subjects in their respective groups. In the Admission Group, subjects with both mental illness and dementia have an average length of stay 44 percent longer than subjects without a mental illness indicator on their medical records.

The presence of behavioral disorders is typically observed with increased mean lengths of stay for all groups; the effect is most pronounced for the Admission Group. For example, the presence of orientation is associated with a 29 percent increase in mean length of stay for Admission Group subjects. However, the *absence* of lethargic behavior is related to a 9 percent increase in mean lengths of stay for Groups 1 and 3.

Table 21 reports the results of a multiple regression model with length of stay as the dependent variable. The presence of dementia only significantly increased length of stay among all groups, while a medical record documenting both dementia and mental illness in the Admission Group results in the strongest effect on length of stay. The presence of Forgetful in the Admission Group, Disoriented in all groups, Antisocial in the Full Current Resident Group, and Self-destructive in the Admission Group significantly increased length of stay. The presence of Lethargic decreased length of stay for all groups, with the greatest effects experienced in the Current Resident Groups.

Table 22 reports the results of a multiple regression model with expenditures per day as the dependent variable. Only the presence of dementia and mental illness is associated with increased daily expenditures. This is observed for the Current Resident Groups, but not for the Admission Group, even though the proportion of persons with a dual diagnosis is similar across groups. The presence of Forgetful in the Full Current Resident Group, Self-destructive in the Admission Group, and Hallucinatory in the Current Resident Groups were all significantly associated with *decreases* in daily expenditures.

These results suggest that differential nursing facility resource utilization by mental illness and behavioral need indicators may depend not only upon the measures of utilization chosen, but also upon the sample of nursing facility residents studied. Agitated, Lethargic, and dementia show consistent effects across all samples for length of stay, but occasionally certain other behaviors and mental illness indicators impact estimates of service use. For expenditures per day, both dementia in combination with mental illness and being hallucinatory impact cost per day among residents, but have no significant impact for new admissions.

Nursing Facility Use and Mental Illness in the National Nursing Home Survey

Analyses were performed on four indicators of stay duration in the NNHS to provide a basis for comparison to the NMES-IPC. The dependent variables were number of days in the previous year, log of days during the previous year, total length of current stay (which could extend beyond one year prior), and a dichotomous indicator of whether or not the resident had been in the facility continuously for all of the previous year. In the NMES-IPC data set, analysis was performed on a single

variable representing the total number of facility stay days in the year subsequent to the initial interview.

There was modest evidence of consistency across the data sets in terms of the mental illness variables. Table 23 shows the results for a regression of NNHS number of days in the previous year. In both the NMES-IPC and the NNHS, individuals with a diagnosis of dementia only had a greater number of days. Having a diagnosis of dementia and another mental illness predicted more days in the NNHS, but was not significant in the NMES-IPC, except for the Admission Group. The size of the coefficients for the NNHS regression is closest to that from the Admission Group regression in the NMES-IPC.

There was minor agreement in the estimated effects of behavioral factors in the two data sets. In the NNHS, residents who displayed agitated behavior had significantly more days in the previous year. In the NMES-IPC, Agitated and Lethargic consistently predicted number of days, while Antisocial, Self-destructive, and Forgetful also showed occasional impacts on days. In general, the NNHS behavioral variables do not show quite the impact on length of stay as the NMES-IPC variables, perhaps because we did not repeat the factor analysis for the NNHS.

Total expenditures was another dependent variable investigated across the two data sets. In the NMES-IPC, we were able to examine total expenditures for 1987. In NNHS we were only able to examine total expenditures in the prior month (Table 24). In the NNHS, having a diagnosis of dementia only was associated with greater expenditures for the prior month. In the NMES-IPC, both dementia only and in combination with a mental illness were related to higher total annual expenditures. With a slight adjustment for inflation, the impact of dementia on total expenditures is similar in the two data sets. In the behavioral factors for the NNHS, only being anxious was associated with greater total expenditures, while in the NMES-IPC, being forgetful or antisocial predicted greater spending in some models, while being hallucinatory or lethargic predicted lower expenditures. Again, the use of the factor analysis based on the NMES-IPC data applied to the NNHS data may lead to less congruence in the results.

As with total expenditures (Table 25), per-diem expenditures also were considered in both the NNHS and the NMES-IPC. The natural logarithm of per-diem expenditures was considered in NNHS, too. Greater per-diem expenditures were associated with having dementia and mental illness only in NMES-IPC. Similarly, being hallucinatory was associated with lower per-diem expenditures in the NMES-IPC. Neither the indicators of mental illness nor the behavioral factors were significant predictors of per-diem expenses in the NNHS.

In summary, both the NNHS and the NMES-IPC regressions suggest that mental illness, dementia, and behaviors play a larger role in explaining total length of stay and total expenditures than they do in explaining daily expenditures. Both suggest that dementia only or in combination with mental illness, and agitated behaviors appear to have quite important impacts on length of stay and total expenditures. As payment systems move towards more capitated approaches, this research would suggest that these factors could play an important role in risk or severity adjustments applied to nursing facility payments.

Survival Modeling of Nursing Facility Stays and Discharges

The cross-sectional regression models suffer from a weakness: they are unadjusted for possible censoring associated with entry and exit into the nursing facility. Thus, to further examine the impact of mental illness and behaviors on nursing facility use, we utilized the NNHS to examine survival models of the data. We also used the NMES-IPC to examine a model of short (less than 90 days) versus long nursing facility stays in a multinomial logistic regression model and Cox proportional hazards model of discharge.

In order to examine the competing risks of death versus discharge in the NNHS, two Cox regression models were compared with the single model predicting discharge for any reason. Because death and discharge can be considered as two independent events the first model predicted time until discharge, treating cases where the facility resident died as censored observations. Likewise, the second model predicted time until death, treating discharged residents as censored observations.

There also was evidence that need characteristics were important in predicting hazard of discharge, as shown in Tables 26 and 27. Both individuals with dementia and those with other mental illness were considerably less likely to be discharged at any time (23.9% and 25.1% as likely, respectively), consistent with our observations that individuals with mental illness report considerably longer stays. Two behavior problems also were important for discharge. Individuals who were anxious were at a 24.0 percent greater risk of discharge, whereas those exhibiting antisocial behavior were 46.5 percent less likely to be discharged at any time.

In the NMES-IPC, estimates of the impact of dementia, mental illness, and behaviors on short versus long nursing facility stays were performed and are shown in Table 28. Residents with mental illness were less likely to experience short versus long episodes compared to residents without similar illness. For example, patients with dementia and mental illness and patients with dementia only were 62 percent and 51 percent less likely, respectively, to have a short episode ending in death versus a long episode, compared to patients with neither mental illness nor dementia. Similarly, patients with dementia only and patients with mental illness only were 36 percent and

34 percent less likely, respectively, to have a short episode ending alive rather than a long episode, compared to patients without mental health problems.

Estimates for the behavioral factors appear to capture an interesting heterogeneity in the sample. The strong reduction in estimated relative risk of a short episode for persons with the Disoriented, Agitated, and Self-destructive factors, compared to residents without these factors, is consistent with the fact that these behavioral disorders are clinical signs of the aforementioned mental illness. Conversely, persons with the Anxious or Lethargic factors exhibited a strong likelihood of having a short episode ending in death rather than a long episode, suggesting an association between these behavioral disturbances and terminal illness for which short-term care is provided. In the second link function, the observation that persons who were anxious or lethargic demonstrate no difference in the odds of leaving after a short episode ending alive versus staying for an extended period would seem to rule out a competing interpretation that persons with these behaviors are receiving short-term mental health treatment (e.g., patients with these factors would not be expected to leave a nursing facility dead if their only health care need was for mental health treatment). It also is clear that, for the second logit function, patients with the Forgetful, Agitated, and Self-destructive factors are, respectively, 34 percent, 33 percent, and 36 percent less likely to experience a short episode ending alive rather than a long episode, compared to patients without these behavioral disorders.

Our results suggest a pattern in which mental illness and its behavioral manifestations, with the exception of certain behaviors associated with a likelihood of dying within a short period of time following admission, correlate with a decreased risk of both types of short nursing facility episodes, relative to long episodes. This association remains after controlling for physical health status indicators as well as a host of control covariates, including delivery system (facility-level) descriptors, individual-level predisposing characteristics, and individual-level enabling characteristics.

Mental Health Treatment in Nursing Facilities and the Community

A two-part model of use of Medicare Part B mental health services was run using the MCBS samples of facility residents and community residents over age 65. The first part of the model estimates the probability of any service use, while the second part estimates the level of use (as the logarithm of number of visits) for all those with at least one visit. The results from these analyses are shown in Tables 29–32. These tables show all estimated coefficients, as well as the point estimate and confidence interval for the odds ratios for those variables with a significance level of .05 or better.

Table 29 shows that only six variables are significant at the $p < .10$ level or better in a logit regression for the probability of any Part B mental health service use

among nursing facility residents. The indicators for mental illness and residence in a metropolitan area both are estimated to have positive impacts on the probability of any service use. Age and three physical conditions—high blood pressure, arthritis, and paralysis—are associated with lower probabilities of service use.

While the regression indicated that those with a mental illness had a 72 percent increase in the odds ratio for having a mental health visit, the overall rates of use for these facility residents still remains quite low. Twenty-six percent of all nursing facility residents had at least one visit to a provider of mental health services. Thirty-six percent of nursing facility residents with an indication of mental illness had at least one such visit. While this is significantly greater than the previous results, it still indicates that a significant portion of those with a mental illness may not be receiving services (especially in light of the high probability that the MCBS indicator provides an undercount of mental illness diagnoses).

The results further indicate that older facility residents and those in rural communities may be markedly disadvantaged in receiving any mental health services. While age is not quite significant at conventional levels ($p=.0569$), it suggests that every additional year of age reduces the odds ratio of receiving any mental health services for a nursing facility resident by .03. Thus, the difference in probability of service use between a 75-year-old resident and an 85-year-old resident is substantial. Furthermore, the impact of metropolitan residence is the single largest effect. Residents in a metropolitan area face a three to eight times higher odds ratio of service receipt. Both results echo those found in prior research. Therefore, while the MCBS data indicate greater probabilities of service use, they still show some significant differences by age and location.

Table 30 exhibits the second part of the two-part model of mental health service use among nursing facility residents in the MCBS. This model was run on the 181 residents who had at least one visit. The results indicate that those of Hispanic origin, with diabetes, and living in a metropolitan area have greater levels of service use. Those in good health (compared to excellent health), with low income (below $25,000), and with a heart condition have lower levels of service use.

Previous studies of mental health service use in nursing facilities did not provide estimates of levels of use because the NMES-IPC and the NNHS do not provide an estimate of numbers of visits like that found in the Medicare claims record in MCBS. The MCBS results suggest that rural residents, in addition to having a lower likelihood of use, have lower levels of use among service users. Those with low income also appear to have significantly lower use among users. The implication of the finding for Hispanic persons is unclear.

Recent changes in Medicare coverage for mental health care suggest that an exploration of the use of mental health services by the community residing elderly is warranted. Tables 31 and 32 provide the results of a two-part model of mental health service use by Medicare beneficiaries.

In Table 31, the results of a logistic regression on the probability of any service use by community-residing Medicare beneficiaries are shown. The regressions indicate that age, poor health, two IADL impairments (making meals and managing money), the mental illness indicator, one physical condition (vascular conditions), and living in a metropolitan area are positively associated with receipt of any services. Male gender, having cancer, and having 12 years of education are negatively associated with service use.

In contrast to the facility residents, the mental illness indicator is the single best predictor of service use. This may be the result of the use of proxies among facility residents or may indicate better matches between need and use in the community. Still, the MCBS data indicate that only 26 percent of community-residing elderly with an indicator of mental illness had any mental health service use in the year. The results on location suggest that facility residents in rural areas are not the only ones to face difficulties in receiving services; the odds ratio of any service use among community residents in metropolitan areas is more than double. Curiously, the effects of age and health among community residents are the opposite of what is seen among facility residents.

Table 32 shows the second part of the two-part model: the estimate of the number of visits (in logarithm) by those who had at least one visit. This regression reveals a positive association between visits and good and poor health, the mental illness indicator, higher levels of education, and living in a metropolitan area. Given the logarithmic format of the dependent variable, the mental illness indicator again is the strongest effect, suggesting that its presence is related to a 56 percent increase in visits. The other variables are all clustered around an approximate 25 percent increase in visits.

In summary, the results of modeling use of Part B mental health service use using the MCBS supports prior work on the use of mental health services by facility residents. While overall service use rates are higher in the MCBS, it is not clear whether this represents a trend or is a result of the use of claims rather than survey data. Overall service use among those with a mental illness is still low as estimated by the MCBS. The regression results using the claims data, however, support previous research that indicates both older facility residents and those in rural areas are significantly less likely to be receiving mental health services. The exploration of mental health service use among community-residing Medicare beneficiaries is largely

similar to that among facility residents, with a few notable exceptions regarding the relationship between age and health and service use.

CONCLUSION

In conclusion, our results indicate that mental illness, dementia, and resident behaviors appear to play a more important role in determining total costs and total number of days of nursing facility care used than they do for per-diem costs. As a result, the movement of post-acute and long-term care payment systems towards capitation must take into account the longer lengths of stay for these patients. Further research is needed on the impact of these factors on nursing facility costs and uses, because the measurements used in the secondary analyses in this study are quite inaccurate. Detailed data on costs, resident diagnoses, and behaviors would be necessary to create a payment system that could adjust for resource use over an annual period or over a nursing facility episode.

In addition, our results indicate that use of mental health services among nursing facility residents and community residents continued to be quite low despite nursing home reforms and Medicare payment policy changes. Although it may be too early to detect an effect of recent policy changes, the results show that previous findings from survey data of low levels of service use were present in claims data in 1992. In addition, the results show that older nursing facility residents, particularly in rural regions, may face even greater difficulties in receiving needed mental health services. Medicare's mental health services have long been neglected in research. As one of the few areas where fee-for-service medicine is still the norm, important questions about the cost-effectiveness of such service use remain.

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APPENDIX A

Technical Terms

Breslow and Efron methods: alternative methods for handling ties in computing likelihood functions used in survival models.

Cox proportional hazards/regression model: nonparametric estimation methods used to estimate the impact of independent variables on a dependent variable, survival time.

Diagnostic accuracy bias: errors in the diagnostic record for a patient.

Weibull model: a parametric estimation method used to estimate the impact of independent variables on a dependent variable, survival time.

Table 1
Descriptive Statistics for National Medical Expenditure Survey-Institutional Population Component (NMES-IPC) Samples, Continuous Variables

Variable	Full Current Resident Group		Admission Group		Partial Current Resident Group	
	Mean	SD	Mean	SD	Mean	SD
Length of stay	317	97.47	176	134.08	319	98.88
Expenses per day	$51.46	$26.23	$65.29	$47.62	$51.12	$26.68
Age	78.73	14.48	78.05	13.40	78.88	14.46
Activities of Daily Living (ADL) scale	4.61	2.84	4.86	2.73	4.58	2.84

Note: Full Current Resident Group = members of the NMES-IPC current resident cohort or the NMES-IPC dual cohort (N = 3,572)
Admission Group = members of the NMES-IPC dual cohort or the NMES-IPC admission cohort (N = 2,834)
Partial Current Resident Group = members of the NMES-IPC current resident cohort only (N = 2,729)

Table 2

Descriptive Statistics for National Medical Expenditure Survey-Institutional Population Component (NMES-IPC) Samples, Facility Variables

Variable	Coding	Full Current Resident Group	Admission Group	Partial Current Resident Group
Facility Variables			**Percent of Sample**	
Living in for-profit home	1 = yes, 0 = no	68	72	66
Living in non-profit home	1 = yes, 0 = no	22	21	24
Living in chain home	1 = yes, 0 = no	53	57	51
Living in home with 50≤beds<99	1 = yes, 0 = no	26	24	26
Living in home with 100≤beds<199	1 = yes, 0 = no	45	48	44
Living in home with beds≥200	1 = yes, 0 = no	17	16	18
Living in hospital-based home	1 = yes, 0 = no	10	12	11
Living in home with waiting list	1 = yes, 0 = no	57	53	58
Living in home with any beds certified to Intermediate Care Facility (ICF)	1 = yes, 0 = no	64	61	65
Living in home with any Medicare Skilled Nursing Facility (SNF) beds	1 = yes, 0 = no	50	59	49
Living in home with any Medicaid SNF beds	1 = yes, 0 = no	60	64	59
In home with any beds not certified	1 = yes, 0 = no	9	10	9
Offering defined medical services	1 = yes, 0 = no	57	63	57
Offering defined rehabilitative services	1 = yes, 0 = no	93	94	94
Offering counseling services	1 = yes, 0 = no	75	76	76

Note: Full Current Resident Group = members of the NMES-IPC current resident cohort or the NMES-IPC dual cohort (N = 3,572)
Admission Group = members of the NMES-IPC dual cohort or the NMES-IPC admission cohort (N = 2,834)
Partial Current Resident Group = members of the NMES-IPC current resident cohort only (N = 2,729)

Table 3
Descriptive Statistics for National Medical Expenditure Survey-Institutional Population Component (NMES-IPC), Predisposing Variables

Variable	Coding	Full Current Resident Group	Admission Group	Partial Current Resident Group
Predisposing Variables			**Percent of Sample**	
Male	1 = male, 0 = female	29	37	28
Female	1 = male, 0 = female	71	63	72
White	1 = white, 0 = nonwhite	90	91	91
Nonwhite	1 = white, 0 = nonwhite	10	9	9
Married (currently)	1 = yes, 0 = no	13	25	12
Not married (currently)	1 = yes, 0 = no	87	75	88
Living brothers	1 = yes, 0 = no	31	32	30
Living sisters	1 = yes, 0 = no	40	40	40
Living sons	1 = yes, 0 = no	37	43	36
Living daughters	1 = yes, 0 = no	39	42	38
Prior Institutionalization Experience—Residence immediately before current nursing home placement:				
Hospital	1 = yes, 0 = no	31	57	29
Nursing home	1 = yes, 0 = no	17	10	14
Other facility	1 = yes, 0 = no	10	5	10
Community	1 = yes, 0 = no	42	28	47
Prior Institutionalization Experience—Subjects who were ever residents of a:				
Rehabilitation facility	1 = yes, 0 = no	9	9	8
Facility for persons with mental retardation or developmental disabilities	1 = yes, 0 = no	6	3	7
Psychiatric hospital	1 = yes, 0 = no	13	8	13
Nursing home or facility for persons with "special needs"	1 = yes, 0 = no	58	46	54
Community	1 = yes, 0 = no	14	34	18

Note: Full Current Resident Group = members of the NMES-IPC current resident cohort or the NMES-IPC dual cohort (N = 3,572)
Admission Group = members of the NMES-IPC dual cohort or the NMES-IPC admission cohort (N = 2,834)
Partial Current Resident Group = members of the NMES-IPC current resident cohort only (N = 2,729)

Table 4
Descriptive Statistics for National Medical Expenditure Survey-Institutional Population Component (NMES-IPC), Enabling Variables

Variable	Coding	Full Current Resident Group	Admission Group	Partial Current Resident Group
Enabling Variables		**Percent of Sample**		
Covered by Medicare	1 = yes, 0 = no	94	91	93
Covered by Medicaid	1 = yes, 0 = no	70	47	71
Covered by Champus	1 = yes, 0 = no	4	4	3
Covered by private insurance	1 = yes, 0 = no	48	57	48
Covered by other public assistance	1 = yes, 0 = no	33	21	34
In low-income group	1 = yes, 0 = no	33	35	33
In mid-income group	1 = yes, 0 = no	15	19	14
In high-income group	1 = yes, 0 = no	6	10	6
Income unknown	1 = yes, 0 = no	46	36	47
Less than high school education	1 = yes, 0 = no	31	17	32
With some high school education	1 = yes, 0 = no	9	19	8
High school graduates	1 = yes, 0 = no	19	21	19
With postsecondary education	1 = yes, 0 = no	11	13	11
Unknown education	1 = yes, 0 = no	30	30	30

Note: Full Current Resident Group = members of the NMES-IPC current resident cohort or the NMES-IPC dual cohort (N = 3,572)
Admission Group = members of the NMES-IPC dual cohort or the NMES-IPC admission cohort (N = 2,834)
Partial Current Resident Group = members of the NMES-IPC current resident cohort only (N = 2,729)

Table 5
Descriptive Statistics for National Medical Expenditure Survey-Institutional Population Component (NMES-IPC), Need Variables

Variable	Coding	Full Current Resident Group	Admission Group	Partial Current Resident Group
Physical Illness Variables		**Percent of Sample**		
Cardiovascular condition(s)	1 = yes, 0 = no	68	66	68
Arthritis	1 = yes, 0 = no	31	23	32
Cancer	1 = yes, 0 = no	8	15	8
Diabetes	1 = yes, 0 = no	15	15	15
Coma	1 = yes, 0 = no	<1	<1	<1
Other physical conditions	1 = yes, 0 = no	14	10	14

Note: Full Current Resident Group = members of the NMES-IPC current resident cohort or the NMES-IPC dual cohort (N = 3,572)
Admission Group = members of the NMES-IPC dual cohort or the NMES-IPC admission cohort (N = 2,834)
Partial Current Resident Group = members of the NMES-IPC current resident cohort only (N = 2,729)

Table 6
Descriptive Statistics for National Medical Expenditure Survey-Institutional Population Component (NMES-IPC), Behavior and Mental Illness Variables[a]

Variable	Coding	Full Current Resident Group	Admission Group	Partial Current Resident Group
Behavior Disorder Variables			**Percent of Sample**	
Forgetful	1 = yes, 0 = no	67	58	67
Agitated	1 = yes, 0 = no	43	44	43
Anxious	1 = yes, 0 = no	94	81	94
Disoriented	1 = yes, 0 = no	47	37	48
Antisocial	1 = yes, 0 = no	15	9	16
Self-destructive	1 = yes, 0 = no	22	17	22
Hallucinatory	1 = yes, 0 = no	23	15	24
Lethargic	1 = yes, 0 = no	28	26	28
Mental Illness Variables				
Dementia and mental illness	1 = yes, 0 = no	15	10	15
Dementia only	1 = yes, 0 = no	27	22	27
Mental illness only	1 = yes, 0 = no	17	14	18
None	1 = yes, 0 = no	41	54	41

Note: Full Current Resident Group = members of the NMES-IPC current resident cohort or the NMES-IPC dual cohort (N = 3,572)
Admission Group = members of the NMES-IPC dual cohort or the NMES-IPC admission cohort (N = 2,834)
Partial Current Resident Group = members of the NMES-IPC current resident cohort only (N = 2,729)

[a]In the NMES-IPC, the diagnostic variable *mental illness* was created by recoding seven mental disorders recorded in patients' medical records (senile dementia, depressive disorders, schizophrenia, other psychoses, anxiety disorders, personality disorders, other mental disorders) into four broad diagnostic categories: dementia and mental illness, dementia only, mental illness only, and neither dementia nor mental illness (none). In the MCBS, the presence of a mental illness was defined through self-report, combined with HCFA survey data indicating Medicare eligibility as a result of having a mental illness. In the NNHS, the procedure for developing mental illness indicators was similar to that for NMES-IPC.

Table 7
Descriptive Statistics for Medicare Current Beneficiary Survey (MCBS), Community Sample[a]: Predisposing and Enabling Variables

Variable	Mean	SD	Percent of Sample
Predisposing Variables			
Age	76	7.4	
Health			
Excellent or Very Good			31
Good			30
Fair or Poor			39
Gender			
Male			40
Female			60
Race			
Nonwhite			14
White			86
Marital Status			
Married			51
Unmarried			49
Number of living children	2.6	2.2	
Enabling Variables			
Income under $25,000			28
Living in metropolitan area			59
Living in nonmetropolitan area			41
Insurance coverage in addition to Medicare			
Employer-sponsored			39
Individual purchase			44
Medicaid			9
Education			
Unknown			1
0–8 years			30
9–11 years			16
12 years			29
13 or more years			24

[a]N=9,625

Table 8
Descriptive Statistics for Medicare Current Beneficiary Survey (MCBS), Community Sample[a]: Need Variables

Variable	Percent of Sample
Conditions	
Heart	35
Cancer	28
High blood pressure	49
Vascular	20
Diabetes	14
Arthritis	52
Osteoporosis	7
Paralysis	6
Chronic obstructive pulmonary disease	12
Activities of Daily Living (ADL) Limitations[b]	
Bathing	17
Toileting	8
Dressing	10
Eating	4
Getting in or out of chairs	18
Walking	34
Instrumental Activities of Daily Living (IADL) Limitations[b]	
Light housework	12
Heavy housework	27
Making meals	8
Using the phone	9
Shopping	14
Managing money	6
Mental Illness[c]	2

[a]N=9,625

[b]Note that individuals included in sample percentages for these variables "need help" performing these activities.

[c]In the NMES-IPC, the diagnostic variable *mental illness* was created by recoding seven mental disorders recorded in patients' medical records (senile dementia, depressive disorders, schizophrenia, other psychoses, anxiety disorders, personality disorders, other mental disorders) into four broad diagnostic categories: dementia and mental illness, dementia only, mental illness only, and neither dementia nor mental illness (none). In the MCBS, the presence of a mental illness was defined through self-report, combined with HCFA survey data indicating Medicare eligibility as a result of having a mental illness. In the NNHS, the procedure for developing mental illness indicators was similar to that for NMES-IPC.

Table 9
Descriptive Statistics for Medicare Current Beneficiary Survey (MCBS), Facility Sample[a]: Predisposing and Enabling Variables

Variable	Mean	SD	Percent of Sample
Predisposing Variables			
Age	86	7.3	
Gender			
Male			25
Female			75
Race			
Nonwhite			10
White			90
Marital Status			
Married			12
Unmarried			88
Enabling Variables			
Income under $25,000			34
Living in metropolitan area			52
Living in nonmetropolitan area			48
Medicaid			62
Education			
Unknown			38
0–8 years			26
9–11 years			6
12 years			19
13 or more years			11

[a]N=692

Table 10
Descriptive Statistics for Medicare Current Beneficiary Survey (MCBS), Facility Sample[a]: Need Variables

Variable	Percent of Sample
Conditions	
Heart	51
Cancer	16
High blood pressure	38
Vascular	48
Diabetes	17
Arthritis	41
Osteoporosis	16
Paralysis	16
Chronic obstructive pulmonary disease	12
Activities of Daily Living (ADL) Limitations[b]	
Bathing	93
Toileting	71
Dressing	83
Eating	44
Getting in or out of chairs	72
Walking	79
Instrumental Activities of Daily Living (IADL) Limitations[b]	
Using the phone	39
Shopping	43
Managing money	42
Mental Illness[c]	20

[a]N=692

[b]Note that individuals included in sample percentages for these variables "need help" performing these activities.

[c]In the NMES-IPC, the diagnostic variable *mental illness* was created by recoding seven mental disorders recorded in patients' medical records (senile dementia, depressive disorders, schizophrenia, other psychoses, anxiety disorders, personality disorders, other mental disorders) into four broad diagnostic categories: dementia and mental illness, dementia only, mental illness only, and neither dementia nor mental illness (none). In the MCBS, the presence of a mental illness was defined through self-report, combined with HCFA survey data indicating Medicare eligibility as a result of having a mental illness. In the NNHS, the procedure for developing mental illness indicators was similar to that for NMES-IPC.

Table 11
Descriptive Statistics for National Nursing Home Survey (NNHS)[a], Dependent Variables

Variable	Mean	SD	Percent of Sample
Dependent Variables			
Number of days in past year	301	112	
Total length of stay	1,026	1,254	
Total monthly charges	$1,463	$677	
Per-diem expenditures	$55	$76	
In facility all of past year			64

[a]N=4,646

Table 12
Descriptive Statistics for the National Nursing Home Survey (NNHS)[a], Independent Variables

Variable	Coding	Mean	SD	Percent of Sample
Independent Variables				
Activities of Daily Living (ADL) impairment		4	2	
Facility Variables				
Proprietary ownership	1 = yes, 0 = no			68
Facility part of a chain	1 = yes, 0 = no			50
Home has 50 ≤ beds < 99	1 = yes, 0 = no			29
Home has 100 ≤ beds < 199	1 = yes, 0 = no			44
Home has 200 ≥ beds	1 = yes, 0 = no			20
Home has > 50 beds	1 = yes, 0 = no			7
Facility provides mental health services	1 = yes, 0 = no			74
Facility provides rehabilitation services	1 = yes, 0 = no			91
Living in home with any Intermediate Care Facility (ICF)-certified beds	1 = yes, 0 = no			72
Living in home with any Medicare Skilled Nursing Facility (SNF) beds	1 = yes, 0 = no			51
Living in home with any Medicaid SNF beds	1 = yes, 0 = no			62
Living in home with any non-certified beds	1 = yes, 0 = no			9
Predisposing Variables				
Female	1 = yes, 0 = no			75
Male	1 = yes, 0 = no			25
Age		83	8	
White	1 = yes, 0 = no			93
Nonwhite	1 = yes, 0 = no			7
Married	1 = yes, 0 = no			13
Living children	1 = yes, 0 = no			63
Previously resident of a nursing home	1 = yes, 0 = no			24

Table 12
Descriptive Statistics for the National Nursing Home Survey (NNHS)[a], Independent Variables
(continued)

Variable	Coding	Mean	SD	Percent of Sample
Predisposing Variables (continued)				
Admitted to current facility from a nursing home	1 = yes, 0 = no			16
Admitted to current facility from hospital	1 = yes, 0 = no			24
Enabling Variables				
Medicaid eligibility	1 = yes, 0 = no			41
Other public assistance	1 = yes, 0 = no			12
Private payments	1 = yes, 0 = no			70
Need Variables[b]				
Cancer	1 = yes, 0 = no			6
Diabetes	1 = yes, 0 = no			13
Cardiovascular disease	1 = yes, 0 = no			67
Arthritis	1 = yes, 0 = no			20
Other physical health problem	1 = yes, 0 = no			65
Dementia and mental illness	1 = yes, 0 = no			19
Dementia only	1 = yes, 0 = no			32
Mental illness only	1 = yes, 0 = no			15

[a]N=4,646

[b]In the NMES-IPC, the diagnostic variable *mental illness* was created by recoding seven mental disorders recorded in patients' medical records (senile dementia, depressive disorders, schizophrenia, other psychoses, anxiety disorders, personality disorders, other mental disorders) into four broad diagnostic categories: dementia and mental illness, dementia only, mental illness only, and neither dementia nor mental illness (none). In the MCBS, the presence of a mental illness was defined through self-report, combined with HCFA survey data indicating Medicare eligibility as a result of having a mental illness. In the NNHS, the procedure for developing mental illness indicators was similar to that for NMES-IPC.

Table 13
Descriptive Statistics on Behaviors in the Partial
Current Resident Group of the National Medical Expenditures Survey-
Institutional Population Component (NMES-IPC)[a]

Behavior	Coding	Percent of Sample
Forget things just happened	1 = yes, 0 = no	57
Forget important past events	1 = yes, 0 = no	49
Ever seem confused about time	1 = yes, 0 = no	52
Have trouble making decisions	1 = yes, 0 = no	50
Getting lost or wanders	1 = yes, 0 = no	11
Know or recognize family	1 = yes, 0 = no	91
Know or recognize staff	1 = yes, 0 = no	88
Know where is/was	1 = yes, 0 = no	80
Socializes with family	1 = yes, 0 = no	78
Socializes with friends	1 = yes, 0 = no	73
Frequently impatient/easily annoyed	1 = yes, 0 = no	36
Gets upset/yells	1 = yes, 0 = no	32
Hurts other people	1 = yes, 0 = no	12
Frequently suspicious/not trusting	1 = yes, 0 = no	19
Frequently worried or apprehensive	1 = yes, 0 = no	34
Have problems with insomnia	1 = yes, 0 = no	13
Cries without reason	1 = yes, 0 = no	9
Feels worthless, no good	1 = yes, 0 = no	14
Hides things	1 = yes, 0 = no	9
Steals	1 = yes, 0 = no	4
Dresses inappropriately	1 = yes, 0 = no	10
Exposes self	1 = yes, 0 = no	6
Not able to avoid danger	1 = yes, 0 = no	11
Hurts self physically	1 = yes, 0 = no	3
Have problem with falling often	1 = yes, 0 = no	8
Ever have hallucinations	1 = yes, 0 = no	13
Ever have delusions	1 = yes, 0 = no	24
Frequently unresponsive or withdrawn	1 = yes, 0 = no	18
Frequently drowsy/dull or sluggish	1 = yes, 0 = no	20

[a]N=2,729

Table 14
Rotated Factor Pattern, National Medical Expenditures Survey-Institutional Population Component (NMES-IPC), Partial Current Resident Group

Variable	Factor 1 Forgetful	Factor 2 Disoriented	Factor 3 Agitated	Factor 4 Anxious	Factor 5 Antisocial	Factor 6 Self-destructive	Factor 7 Hallucinatory	Factor 8 Lethargic
BFORGTMI	**0.83189**	-0.09992	0.11399	0.03244	0.02685	0.01966	0.08918	0.08306
BFORGTEV	**0.81716**	-0.18584	0.09132	-0.01378	0.02545	0.02248	0.11447	0.11980
BTIME	**0.81293**	-0.14210	0.05902	0.04394	-0.00597	0.06280	0.07453	0.10405
BLOGICDE	**0.81146**	-0.17557	0.12192	0.04590	0.05711	0.05212	0.10179	0.14173
BGETLOST	**0.41656**	0.04457	-0.06222	0.24769	0.36751	0.34416	0.00494	-0.14586
BRECOGNZ	-0.08250	**0.80887**	0.02183	-0.03271	-0.02422	-0.01386	-0.03062	-0.00429
BRECSTAF	-0.22629	**0.78236**	0.02813	-0.08656	0.02623	-0.12512	-0.00828	0.02753
BKWHER	-0.40807	**0.67188**	0.02088	-0.05001	-0.00765	-0.16857	-0.01245	0.00568
BSOCFAML	0.05972	**0.52009**	-0.09907	0.11775	-0.11097	0.18398	-0.08140	-0.20601
BSOCFRND	-0.18255	**0.49962**	-0.11661	0.07104	0.06983	0.01513	-0.04335	-0.35931
BANYED	0.06242	0.00906	**0.73414**	0.30665	0.10754	-0.01378	-0.00930	-0.04349
BUPSET	0.17114	-0.08161	**0.72620**	0.19233	0.05556	0.15931	0.11614	-0.05567
BHURTPPL	0.09816	-0.02612	**0.66502**	-0.09163	0.08556	0.33891	0.01159	0.07682
BTRUST	0.06845	0.00227	**0.54162**	0.31419	0.19710	-0.04821	0.29487	0.07109
BWORRIED	0.00382	0.02766	0.18707	**0.68960**	0.07417	-0.07223	0.05541	0.04719
BINSOMNI	-0.03237	-0.05678	0.02152	**0.52746**	-0.05172	0.24583	0.05822	-0.06625

Table 14
Rotated Factor Pattern, National Medical Expenditures Survey-Institutional Population Component (NMES-IPC), Partial Current Resident Group[a]
(continued)

Variable	Factor 1 Forgetful	Factor 2 Disoriented	Factor 3 Agitated	Factor 4 Anxious	Factor 5 Antisocial	Factor 6 Self-destructive	Factor 7 Hallucinatory	Factor 8 Lethargic
BCRYING	0.09411	-0.04981	0.12982	**0.51322**	0.01164	0.03024	0.11969	0.11170
BGOOD	0.03730	0.12439	0.16963	**0.51118**	0.08084	-0.08315	0.19121	0.24653
BHOARDNG	0.02869	0.00815	0.14371	0.03752	**0.78550**	-0.04006	0.00885	-0.00232
BSTEALNG	-0.02407	-0.03789	0.08271	-0.03394	**0.73788**	0.06421	0.04407	0.07275
BDRESNAP	0.14205	-0.02695	0.11344	0.06880	**0.48000**	0.40082	0.14621	-0.09196
BEXPOSNG	0.01722	-0.06433	0.18918	-0.13039	0.09308	**0.58158**	0.22520	0.00522
BDANGERS	0.33228	-0.09513	-0.00195	0.23861	0.31679	**0.49593**	-0.02696	-0.08871
BHURTSLF	-0.05216	0.02642	0.25578	0.01892	-0.02213	**0.46019**	0.12033	0.27686
BFALLING	0.10772	-0.00046	-0.02551	0.31972	-0.05406	**0.42034**	-0.19166	0.09463
BHALLUCN	0.12601	-0.07182	0.04128	0.15760	0.01619	0.10204	**0.83138**	0.07463
BDELUSON	0.25132	-0.07220	0.19454	0.22120	0.10555	0.10771	**0.72699**	0.03196
BWDRAWN	0.10664	-0.18300	-0.01577	0.10753	0.02345	0.02341	0.10539	**0.75961**
BSLUGISH	0.20023	-0.03167	-0.02906	0.14644	-0.00812	0.08634	-0.03510	**0.71557**

Note: Bold type indicates into which factor the behavior fell. The complete descriptions of the behaviors are given in Table 14. The variables in this table correspond in order to the variables in that table.
[a]N=2,729

Table 15
Percent of Sample with Behavioral Factors, National Medical Expenditures Survey-Institutional Population Component (NMES-IPC), Partial Current Resident Group[a]

Variable	Coding	Percent of Sample
Forgetful (Factor 1)	1 = yes, 0 = no	67
Disoriented (Factor 2)	1 = yes, 0 = no	94
Agitated (Factor 3)	1 = yes, 0 = no	48
Anxious (Factor 4)	1 = yes, 0 = no	43
Antisocial (Factor 5)	1 = yes, 0 = no	16
Self-destructive (Factor 6)	1 = yes, 0 = no	22
Hallucinatory (Factor 7)	1 = yes, 0 = no	24
Lethargic (Factor 8)	1 = yes, 0 = no	29

[a]N=2,729

Table 16
Percent of Persons with Behavior by Conditions Indicated on Medical Record: National Medical Expenditures Survey-Institutional Population Component (NMES-IPC), Partial Current Resident Group[a, b]

	Medical Records Indicate:													
	Senile Dementia		Depressive Disorders		Schizophrenia		Other Psychoses		Anxiety Disorders		Personality Disorders		Other Mental Disorders	
	Percent of Sample													
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Forgetful (Factor 1)	89	51	67	67	57	68	76	66	71	66	74	66	84	66
Disoriented (Factor 2)	90	96	97	93	99	93	93	94	96	93	94	94	88	94
Agitated (Factor 3)	52	46	64	45	69	47	79	47	73	45	83	44	67	47
Anxious (Factor 4)	44	43	68	39	55	42	66	42	75	39	64	41	55	43
Antisocial (Factor 5)	19	14	20	15	38	14	36	15	29	14	36	14	24	16
Self-destructive (Factor 6)	30	17	28	21	27	22	37	21	32	21	38	20	35	21
Hallucinatory (Factor 7)	31	18	35	22	55	21	60	22	43	21	53	20	44	23
Lethargic (Factor 8)	36	22	38	26	31	28	35	28	35	27	35	27	33	28

[a]The table indicates that 89 percent of those with senile dementia are reported to have forgetful behavior. Similar interpretations apply for the other columns.

[b]N=2,729

Table 17
Regression Coefficients for Linear Regression of Nursing Facility Length of Stay, National Medical Expenditures Survey-Institutional Population Component (NMES-IPC), Partial Current Resident Group[a]

	Model 1	Model 2		Model 3	
Variable		Coefficient	S.E.	Coefficient	S.E.
Behavioral Disorder Variables					
Forgetful (Factor 1)		2.51	4.37	0.25	4.53
Disoriented (Factor 2)		0.38	7.98	1.75	8.02
Agitated (Factor 3)		8.98*	4.00	8.86*	4.01
Anxious (Factor 4)		-1.51	3.97	-0.93	4.04
Antisocial (Factor 5)		6.79	5.37	6.09	5.37
Self-destructive (Factor 6)		4.18	4.70	3.84	4.71
Hallucinatory (Factor 7)		6.46	4.68	-7.03	4.71
Lethargic (Factor 8)		-14.28***	4.18	-14.95***	4.20
Mental Illness Variables[b]					
Dementia and mental illness				5.23	5.89
Dementia only				11.51*	4.86
Mental illness only				5.26	5.64
F statistic	8.548***	7.869***		7.605***	
F_{change} statistic		2.844***		1.898***	
Adjusted R^2	.1321	.1369		.1378	

* $p < .10$; ** $p < .05$; *** $p < .01$

[a]N=2,729

[b]In the NMES-IPC, the diagnostic variable *mental illness* was created by recoding seven mental disorders recorded in patients' medical records (senile dementia, depressive disorders, schizophrenia, other psychoses, anxiety disorders, personality disorders, other mental disorders) into four broad diagnostic categories: dementia and mental illness, dementia only, mental illness only, and neither dementia nor mental illness (none). In the MCBS, the presence of a mental illness was defined through self-report, combined with HCFA survey data indicating Medicare eligibility as a result of having a mental illness. In the NNHS, the procedure for developing mental illness indicators was similar to that for NMES-IPC.

Table 18
Regression Coefficients for Linear Regression on Expenditures Per Day,
National Expenditures Survey-Institutional Population Component (NMES-IPC), Partial Current Resident Group[a]

	Model 1	Model 2		Model 3	
Variable		Coefficient	S.E.	Coefficient	S.E.
Behavioral Disorder Variables					
Forgetful (Factor 1)		1.45	1.02	0.66	1.05
Disoriented (Factor 2)		0.37	1.85	0.85	1.86
Agitated (Factor 3)		0.65	0.93	0.50	0.93
Anxious (Factor 4)		0.43	0.93	0.28	0.94
Antisocial (Factor 5)		2.07	1.25	1.83	1.25
Self-destructive (Factor 6)		-0.32	1.09	-0.56	1.09
Hallucinatory (Factor 7)		-2.06	1.09	-2.48*	1.09
Lethargic (Factor 8)		-0.73	0.97	-0.94	0.97
Mental Illness Variables[b]					
Dementia and mental illness				5.12***	1.37
Dementia only				1.69	1.13
Mental illness only				0.53	1.31
F statistic	28.978***	25.448***		24.626***	
F_{change} statistic		1.120		5.002***	
Adjusted R^2	.3606	.3609		.3637	

* $p < .10$; ** $p < .05$; *** $p < .01$

[a]N=2,729

[b]In the NMES-IPC, the diagnostic variable *mental illness* was created by recoding seven mental disorders recorded in patients' medical records (senile dementia, depressive disorders, schizophrenia, other psychoses, anxiety disorders, personality disorders, other mental disorders) into four broad diagnostic categories: dementia and mental illness, dementia only, mental illness only, and neither dementia nor mental illness (none). In the MCBS, the presence of a mental illness was defined through self-report, combined with HCFA survey data indicating Medicare eligibility as a result of having a mental illness. In the NNHS, the procedure for developing mental illness indicators was similar to that for NMES-IPC.

Table 19
Regression Coefficients for Linear Regression of Total Annual Expenditures for National Medical Expenditures Survey-Institutional Population Component (NMES-IPC), Partial Current Resident Group[a]

	Model 1	Model 2		Model 3	
Variable		Coefficient	S.E.	Coefficient	S.E.
Behavioral Disorder Variables					
Forgetful (Factor 1)		860.78*	398.97	500.84	412.50
Disoriented (Factor 2)		-86.26	728.21	139.87	730.25
Agitated (Factor 3)		619.60	364.64	576.98	365.20
Anxious (Factor 4)		-74.94	363.67	-77.31	368.24
Antisocial (Factor 5)		1008.16*	489.52	906.21	489.54
Self-destructive (Factor 6)		423.95	428.89	329.48	428.90
Hallucinatory (Factor 7)		-961.97*	426.83	-1105.70*	429.28
Lethargic (Factor 8)		-1181.24**	381.66	-1262.82***	382.77
Mental Illness Variables[b]					
Dementia and mental illness				1815.95***	536.84
Dementia only				1015.31*	442.28
Mental illness only				157.38	513.58
F statistic	16.097***	14.609***		14.210***	
F_{change} statistic		3.540***		4.600***	
Adjusted R^2	.2334	.2391		.2422	

* $p < .10$; ** $p < .05$; *** $p < .01$

[a]N=2,729

[b]In the NMES-IPC, the diagnostic variable *mental illness* was created by recoding seven mental disorders recorded in patients' medical records (senile dementia, depressive disorders, schizophrenia, other psychoses, anxiety disorders, personality disorders, other mental disorders) into four broad diagnostic categories: dementia and mental illness, dementia only, mental illness only, and neither dementia nor mental illness (none). In the MCBS, the presence of a mental illness was defined through self-report, combined with HCFA survey data indicating Medicare eligibility as a result of having a mental illness. In the NNHS, the procedure for developing mental illness indicators was similar to that for NMES-IPC.

Table 20
Means for Nursing Home Use by Selected Independent Variables, National Medical Expenditures Survey-Institutional Population Component (NMES-IPC)

	Total Expenditures			Expenditures Per Day			Length of Stay (Days)		
	Group			Group			Group		
Variable	1	2	3	1	2	3	1	2	3
Mental Illness Variables[a]									
Dementia and mental illness	$ 17,720	$ 11,884	$ 17,910	$ 56.26	$ 62.72	$ 56.62	317	218	318
Dementia only	$ 16,735	$ 10,085	$ 16,887	$ 54.59	$ 60.24	$ 54.61	310	205	313
Mental illness only	$ 15,132	$ 9,348	$ 15,022	$ 46.39	$ 59.59	$ 45.54	333	200	335
None	$ 15,457	$ 7,524	$ 15,414	$ 49.77	$ 68.96	$ 49.26	315	151	317
Behavioral Disorder Variables									
Forgetful									
Absent	$ 15,240	$ 7,565	$ 15,137	$ 48.00	$ 69.03	$ 47.38	326	157	329
Present	$ 16,500	$ 9,589	$ 16,591	$ 53.17	$ 62.47	$ 52.98	313	190	314
Disoriented									
Absent	$ 15,711	$ 7,841	$ 15,582	$ 51.11	$ 67.09	$ 50.47	312	159	314
Present	$ 16,487	$ 10,263	$ 16,670	$ 51.84	$ 62.12	$ 51.82	323	205	324
Agitated									
Absent	$ 15,951	$ 8,266	$ 16,019	$ 51.08	$ 65.82	$ 50.93	316	171	319
Present	$ 16,255	$ 9,274	$ 16,223	$ 51.95	$ 64.65	$ 51.38	319	183	319

Table 20
Means for Nursing Home Use by Selected Independent Variables, National Medical Expenditures Survey-Institutional Population Component (NMES-IPC)
(continued)

	Total Expenditures			Expenditures Per Day			Length of Stay (Days)		
	Group			Group			Group		
	1	2	3	1	2	3	1	2	3
Antisocial									
Absent	$ 15,978	$ 8,501	$ 15,990	$ 51.85	$ 66.23	$ 51.53	313	171	315
Present	$ 16,649	$ 11,042	$ 16,719	$ 49.40	$ 55.27	$ 48.99	338	234	339
Self-destructive									
Absent	$ 15,952	$ 8,396	$ 15,918	$ 51.44	$ 66.83	$ 51.01	316	169	318
Present	$ 16,525	$ 10,332	$ 16,781	$ 51.53	$ 57.59	$ 51.52	320	213	322
Hallucinatory									
Absent	$ 16,167	$ 8,391	$ 16,209	$ 51.92	$ 66.75	$ 51.59	317	170	319
Present	$ 15,810	$ 10,611	$ 15,781	$ 41.95	$ 56.88	$ 49.60	318	212	319
Lethargic									
Absent	$ 16,331	$ 8,577	$ 16,359	$ 50.86	$ 64.56	$ 50.57	325	176	327
Present	$ 15,454	$ 9,139	$ 15,459	$ 52.98	$ 67.46	$ 52.54	298	176	300

Note: Group 1 is the Full Current Resident Group (N=3,572). Group 2 is the Admission Group (N=2,834). Group 3 is the Partial Current Resident Group (N=2,729).

* In the NMES-IPC, the diagnostic variable *mental illness* was created by recoding seven mental disorders recorded in patients' medical records (senile dementia, depressive disorders, schizophrenia, other psychoses, anxiety disorders, personality disorders, other mental disorders) into four broad diagnostic categories: dementia and mental illness, dementia only, mental illness only, and neither dementia nor mental illness (none). In the MCBS, the presence of a mental illness was defined through self-report, combined with HCFA survey data indicating Medicare eligibility as a result of having a mental illness. In the NNHS, the procedure for developing mental illness indicators was similar to that for NMES-IPC.

Table 21
Regression Results with Length of Stay as Dependent Variable

	Full Current Resident Group		Admission Group		Partial Current Resident Group	
Variable	Coefficient	SD	Coefficient	SD	Coefficient	SD
Mental Illness Variables[a]						
Dementia and mental illness	4.39	5.11	15.80**	6.68	5.16	5.88
Dementia only	8.05*	4.12	14.11**	4.95	11.43**	4.84
Mental illness only	4.08	4.98	9.51	6.12	5.28	5.64
Behavioral Disorder Variables						
Forgetful	1.25	3.89	11.12**	4.37	0.30	4.52
Agitated	7.53**	3.48	15.73***	4.30	8.89**	4.01
Anxious	-0.09	3.49	-0.86	4.12	-0.88	4.03
Antisocial	9.93**	4.72	6.17	6.99	6.08	5.37
Self-destructive	1.71	4.07	11.19**	5.29	3.84	4.71
Hallucinatory	-6.26	4.16	-0.61	5.61	-7.02	4.71
Lethargic	-14.18***	3.63	-8.86**	4.43	-15.02***	4.19

All other independent variables described in the text were included as controls in this regression.

* $p < .10$; ** $p < .05$; *** $p < .01$

Full Current Resident Group model adjusted $R^2 = .12$; Admission Group model adjusted $R^2 = .50$; Partial Current Resident Group model adjusted $R^2 = .14$

[a]In the NMES-IPC, the diagnostic variable *mental illness* was created by recoding seven mental disorders recorded in patients' medical records (senile dementia, depressive disorders, schizophrenia, other psychoses, anxiety disorders, personality disorders, other mental disorders) into four broad diagnostic categories: dementia and mental illness, dementia only, mental illness only, and neither dementia nor mental illness (none). In the MCBS, the presence of a mental illness was defined through self-report, combined with HCFA survey data indicating Medicare eligibility as a result of having a mental illness. In the NNHS, the procedure for developing mental illness indicators was similar to that for NMES-IPC.

Note: Full Current Resident Group = members of the NMES-IPC current resident cohort or the NMES-IPC dual cohort (N = 3,572)
Admission Group = members of the NMES-IPC dual cohort or the NMES-IPC admission cohort (N = 2,834)
Partial Current Resident Group = members of the NMES-IPC current resident cohort only (N = 2,729)

Table 22
Regression Results with Expenditures Per Day as Dependent Variable

	Full Current Resident Group		Admission Group		Partial Current Resident Group	
Variable	Coefficient	SD	Coefficient	SD	Coefficient	SD
Mental Illness Variables[a]						
Dementia and mental illness	4.59***	1.25	-1.43	3.31	5.08***	1.36
Dementia only	1.54	1.02	-0.60	2.44	1.65	1.12
Mental illness only	0.62	1.21	-1.30	2.95	0.54	1.31
Behavioral Disorder Variables						
Forgetful	0.39	0.96	-5.50**	2.11	0.68	1.05
Agitated	0.51	0.85	2.29	1.98	0.31	0.94
Anxious	0.22	0.85	0.54	2.08	0.51	0.93
Antisocial	1.74	1.13	3.42	3.41	1.83	1.25
Self-destructive	-0.63	0.99	-4.54*	2.58	-0.56	1.09
Hallucinatory	-2.24**	1.00	-1.81	2.73	-2.48**	1.09
Lethargic	-0.85	0.89	1.57	2.16	-0.97	0.97

All other independent variables described in the text were included as controls in this regression.

* $p < .10$; ** $p < .05$; *** $p < .01$

Full Current Resident Group model adjusted $R^2 = .35$; Admission Group model adjusted $R^2 = .25$; Partial Current Resident Group model adjusted $R^2 = .36$

[a]In the NMES-IPC, the diagnostic variable *mental illness* was created by recoding seven mental disorders recorded in patients' medical records (senile dementia, depressive disorders, schizophrenia, other psychoses, anxiety disorders, personality disorders, other mental disorders) into four broad diagnostic categories: dementia and mental illness, dementia only, mental illness only, and neither dementia nor mental illness (none). In the MCBS, the presence of a mental illness was defined through self-report, combined with HCFA survey data indicating Medicare eligibility as a result of having a mental illness. In the NNHS, the procedure for developing mental illness indicators was similar to that for NMES-IPC.

Note: Full Current Resident Group = members of the NMES-IPC current resident cohort or the NMES-IPC dual cohort (N = 3,572)
Admission Group = members of the NMES-IPC dual cohort or the NMES-IPC admission cohort (N = 2,834)
Partial Current Resident Group = members of the NMES-IPC current resident cohort only (N = 2,729)

Table 23
Regression Model with Number of Days in Previous Year as Dependent Variable, National Nursing Home Survey (NNHS)[a]

Variable	Coefficient	S.E.
Dementia and mental illness[b]	14.46**	4.63
Dementia only	18.05****	3.97
Mental illness only	5.52	4.50
Forgetful	-1.45	3.83
Agitated	7.93*	3.93
Anxious	0.24	3.14
Disoriented	4.04	3.74
Self-destructive	1.94	3.69

All other variables described in the text were included as controls in this regression.
* $p < .10$; ** $p < .05$; *** $p < .01$
[a]N=4,464
[b]In the NMES-IPC, the diagnostic variable *mental illness* was created by recoding seven mental disorders recorded in patients' medical records (senile dementia, depressive disorders, schizophrenia, other psychoses, anxiety disorders, personality disorders, other mental disorders) into four broad diagnostic categories: dementia and mental illness, dementia only, mental illness only, and neither dementia nor mental illness (none). In the MCBS, the presence of a mental illness was defined through self-report, combined with HCFA survey data indicating Medicare eligibility as a result of having a mental illness. In the NNHS, the procedure for developing mental illness indicators was similar to that for NMES-IPC.

Table 24
Regression Model with Total Monthly Charge as Dependent Variable

Variable	Coefficient	S.E.
Dementia and mental illness[a]	39.80	28.41
Dementia only	71.16**	24.36
Mental illness only	3.31	27.62
Forgetful	-29.27	23.51
Agitated	5.20	24.08
Anxious	43.58*	19.23
Disoriented	13.71	22.97
Self-destructive	-26.50	22.62

All other variables described in the text were included as controls in this regression.
*p < .10; **p < .05; ***p < .01

[a]In the NMES-IPC, the diagnostic variable *mental illness* was created by recoding seven mental disorders recorded in patients' medical records (senile dementia, depressive disorders, schizophrenia, other psychoses, anxiety disorders, personality disorders, other mental disorders) into four broad diagnostic categories: dementia and mental illness, dementia only, mental illness only, and neither dementia nor mental illness (none). In the MCBS, the presence of a mental illness was defined through self-report, combined with HCFA survey data indicating Medicare eligibility as a result of having a mental illness. In the NNHS, the procedure for developing mental illness indicators was similar to that for NMES-IPC.

Table 25
Regression Model with Past Month's Per-Diem Expenditures as Dependent Variable

Variable	Coefficient	S.E.
Dementia and mental illness[a]	-2.21	3.65
Dementia only	1.38	3.13
Mental illness only	-1.39	3.54
Forgetful	-3.07	3.02
Agitated	-0.52	3.09
Anxious	1.73	2.47
Disoriented	0.56	2.95
Self-destructive	1.49	2.90

All other variables described in the text were included as controls in this regression.
*p < .10; **p < .05; ***p < .01

[a]In the NMES-IPC, the diagnostic variable *mental illness* was created by recoding seven mental disorders recorded in patients' medical records (senile dementia, depressive disorders, schizophrenia, other psychoses, anxiety disorders, personality disorders, other mental disorders) into four broad diagnostic categories: dementia and mental illness, dementia only, mental illness only, and neither dementia nor mental illness (none). In the MCBS, the presence of a mental illness was defined through self-report, combined with HCFA survey data indicating Medicare eligibility as a result of having a mental illness. In the NNHS, the procedure for developing mental illness indicators was similar to that for NMES-IPC.

Table 26
Hazard Ratios for Cox Regression Models, National Nursing Home Survey (NNHS)[a]

	Hazard Ratios			
Variable	First Stay	Last Stay	All Stay1	All Stay2
Dementia and mental illness[b]	0.953	0.946	0.956	0.953
Dementia only	0.952	0.951	0.912	0.905
Mental illness only	0.905	0.916	0.862*	0.861*
Forgetful	0.967	0.967	1.022	1.028
Agitated	1.053	1.039	0.956	0.953
Anxious	1.089	1.088	1.140**	1.136**
Disoriented	1.074	1.111	0.973	0.990
Antisocial	0.760	0.788	0.627**	0.642*
Self-destructive	0.925	0.920	0.937	0.938
Model df & Sig.	43***	43***	42***	42***
Model χ^2	333.703	351.353	525.746	597.172

All other variables described in the text were included as controls in this regression.
*p < .10; **p < .05; ***p < .01
[a]N=4,646
[b]In the NMES-IPC, the diagnostic variable *mental illness* was created by recoding seven mental disorders recorded in patients' medical records (senile dementia, depressive disorders, schizophrenia, other psychoses, anxiety disorders, personality disorders, other mental disorders) into four broad diagnostic categories: dementia and mental illness, dementia only, mental illness only, and neither dementia nor mental illness (none). In the MCBS, the presence of a mental illness was defined through self-report, combined with HCFA survey data indicating Medicare eligibility as a result of having a mental illness. In the NNHS, the procedure for developing mental illness indicators was similar to that for NMES-IPC.

Table 27
Competing Risks of Discharge versus Death via Cox Regression Models, National Nursing Home Survey (NNHS)[a]

	Hazard Ratios	
Variable	Discharge	Death
Dementia and mental illness[b]	0.895	1.004
Dementia only	0.761**	1.010
Mental illness only	0.749**	0.952
Forgetful	0.989	1.057
Agitated	0.890	0.986
Anxious	1.240**	1.086
Disoriented	0.890	0.999
Antisocial	0.535*	0.716
Self-destructive	0.861	0.970
Model df & Sig.	42***	42***
Model χ^2	280.186	500.012

All other variables described in the text were included as controls in this regression.

*p < .10; **p < .05; ***p < .01

[a]N=4,646

[b]In the NMES-IPC, the diagnostic variable *mental illness* was created by recoding seven mental disorders recorded in patients' medical records (senile dementia, depressive disorders, schizophrenia, other psychoses, anxiety disorders, personality disorders, other mental disorders) into four broad diagnostic categories: dementia and mental illness, dementia only, mental illness only, and neither dementia nor mental illness (none). In the MCBS, the presence of a mental illness was defined through self-report, combined with HCFA survey data indicating Medicare eligibility as a result of having a mental illness. In the NNHS, the procedure for developing mental illness indicators was similar to that for NMES-IPC.

Table 28
Multinomial Logistic Regression Results, National Medical Expenditures Survey-Institutional Population Component (NMES-IPC)

Variable	Odds Ratio	S.E.	95% Confidence Interval
For Episode Type = Short, ending in death versus long			
Mental Illness Variables[a]			
Dementia and mental illness	.38**	.14	.19, .77
Dementia only	.49**	.11	.32, .77
Mental illness only	.70	.19	.41, 1.19
Behavioral Disorder Variables			
Forgetful	.91	.17	.63, 1.32
Disoriented	.27***	.09	.13, .54
Agitated	.30***	.09	.13, .54
Anxious	1.80**	.32	1.26, 2.55
Antisocial	.79	.36	.32, 1.91
Self-destructive	.43**	.12	.25, .74
Hallucinatory	.97	.27	.56, 1.68
Lethargic	2.28***	.42	1.60, 3.26
For Episode Type = Short, ending alive versus long			
Mental Illness Variables[a]			
Dementia and mental illness	.74	.16	.97, 1.56
Dementia only	.64**	.10	.48, .87
Mental illness only	.66*	.12	.46, .95
Behavioral Disorder Variables			
Forgetful	.66**	.09	.51, .86
Disoriented	1.03	.37	.51, 2.08
Agitated	.67**	.09	.52, .87
Anxious	1.09	.14	.85, 1.40
Antisocial	1.20	.28	.77, 1.89
Self-destructive	.64*	.11	.46, .90
Hallucinatory	1.04	.19	.74, 1.48
Lethargic	.97	.14	.74, 1.28

Note: All control variables mentioned in the text were included in this regression model.
Model $C^2 = 801.51$, $p = .0000$, pseudo-(McFadden) $R^2 = .1966$
*$p < .10$; ** $p < .05$; *** $p < .01$

[a]In the NMES-IPC, the diagnostic variable *mental illness* was created by recoding seven mental disorders recorded in patients' medical records (senile dementia, depressive disorders, schizophrenia, other psychoses, anxiety disorders, personality disorders, other mental disorders) into four broad diagnostic categories: dementia and mental illness, dementia only, mental illness only, and neither dementia nor mental illness (none). In the MCBS, the presence of a mental illness was defined through self-report, combined with HCFA survey data indicating Medicare eligibility as a result of having a mental illness. In the NNHS, the procedure for developing mental illness indicators was similar to that for NMES-IPC.

Table 29
Logistic Regression for Probability of Any Part B Medicare Mental Health Services, Medicare Current Beneficiary Survey (MCBS)[a] Facility Residents

Variable	Coefficient	Odds Ratio	95% Confidence Interval
Intercept	-.18		
Predisposing Variables			
Age	-.03*		
Male	-.32		
Hispanic	1.81		
Marital status	.02		
Number of living children			
Enabling Variables			
Employer insurance	NA		
Individual insurance	NA		
Medicaid only	.35		
Income	.02		
Education			
9–11 years	-.10		
12 years	.47		
13+ years	.22		
Unknown	.03		
Need Variables			
Good health	.19		
Fair or poor health	-.20		
Instrumental Activities of Daily Living (IADL) Limitations[b]			
Light housework	NA		
Heavy housework	NA		
Making meals	NA		
Using the phone	.14		
Shopping	-.29		
Managing money	.03		

Table 29
Logistic Regression for Probability of Any Part B Medicare Mental Health Services, Medicare Current Beneficiary Survey (MCBS)[a] Facility Residents
(continued)

Variable	Coefficient	Odds Ratio	95% Confidence Interval
Activities of Daily Living (ADL) Limitations[b]			
Bathing	.73		
Toileting	.14		
Dressing	-.08		
Eating	-.26		
Getting in or out of chairs	.33		
Walking	-.04		
Mental Illness[c]	.54**	1.72	(1.06, 2.79)
Heart condition	.09		
Cancer	-.16		
Hypertension	-.49**	.61	(.41, .93)
Vascular condition	-.31		
Diabetes	.14		
Arthritis	-.43**	.65	(.43, .98)
Osteoporosis	-.38		
Paralysis	-1.02***	.36	(.18, .72)
Emphysema, asthma, or COPD	-.52		
Lives with others	NA		
Metropolitan area	1.63***	5.13	(3.33, 7.89)

N = 692
C-statistic = .78
*p < .10; ** p < .05; *** p < .01
[a]N=692
[b]Note that individuals included in sample percentages for these variables "need help" performing these activities.
[c]In the NMES-IPC, the diagnostic variable *mental illness* was created by recoding seven mental disorders recorded in patients' medical records (senile dementia, depressive disorders, schizophrenia, other psychoses, anxiety disorders, personality disorders, other mental disorders) into four broad diagnostic categories: dementia and mental illness, dementia only, mental illness only, and neither dementia nor mental illness (none). In the MCBS, the presence of a mental illness was defined through self-report, combined with HCFA survey data indicating Medicare eligibility as a result of having a mental illness. In the NNHS, the procedure for developing mental illness indicators was similar to that for NMES-IPC.

Table 30
Linear Regressions for the Total Number of Medicare Part B Visits for Mental Health Services, Medicare Current Beneficiary Survey (MCBS)[a] Facility Residents

Variable	Coefficient
Intercept	1.93
Predisposing Variables	
Age	.0002
Male	.24
Hispanic	2.20**
Marital status	0.25
Number of living children	NA
White	
Enabling Variables	
Income	-.66***
Education	
9–11 years	-.11
12 years	-.15
13+ years	.27
Unknown	-.10
Employer insurance	NA
Individual insurance	NA
Medicaid	-.29
Need Variables	
Good health	-.43*
Fair or poor health	-.26
Instrumental Activities of Daily Living (IADL) Limitations[b]	
Light housework	NA
Heavy housework	NA
Making meals	NA
Using the phone	.05*
Shopping	.24
Managing money	-.36

Table 30
Linear Regressions for the Total Number of Medicare Part B Visits for Mental Health Services, Medicare Current Beneficiary Survey (MCBS)[a] Facility Residents
(continued)

Variable	Coefficient
Activities of Daily Living (ADL) Limitations[b]	
Bathing	-.42
Toileting	.18
Dressing	.06
Eating	-.08
Getting in or out of chairs	.26
Walking	-.16
Mental Illness[c]	.18
Physical illness	
Heart condition	-.29*
Cancer	.07
High blood pressure	-.12
Vascular condition	.04
Diabetes	.34*
Arthritis	-.21
Osteoporosis	.26
Paralysis	-.44
Emphysema, asthma, or COPD	.14
Lives with others	NA
Metropolitan area	.37**

N = 181
Adjusted R^2 = .08
*p < .10; ** p < .05; *** p < .01
[a]N=692
[b]Note that individuals included in sample percentages for these variables "need help" performing these activities.
[c]In the NMES-IPC, the diagnostic variable *mental illness* was created by recoding seven mental disorders recorded in patients' medical records (senile dementia, depressive disorders, schizophrenia, other psychoses, anxiety disorders, personality disorders, other mental disorders) into four broad diagnostic categories: dementia and mental illness, dementia only, mental illness only, and neither dementia nor mental illness (none). In the MCBS, the presence of a mental illness was defined through self-report, combined with HCFA survey data indicating Medicare eligibility as a result of having a mental illness. In the NNHS, the procedure for developing mental illness indicators was similar to that for NMES-IPC.

Table 31
Logistic Regression for Probability of Any Part B Medicare Mental Health Services, Medicare Current Beneficiary Survey (MCBS)[a] Community Sample

Variable	Coefficient	Odds Ratio	95% Confidence Interval
Intercept	-6.13		
Predisposing Variables			
Age	0.03***	1.03	(1.01, 1.04)
Male	-.42***	0.66	(0.51, 0.85)
Hispanic	.002		
Marital status	.10		
Number of living children	.04		
White	.27		
Enabling Variables			
Income	-.03		
Education			
9–11 years	.06		
12 years	-.25*		
13+ years	-.21		
Unknown	.04		
Employer insurance	-.22		
Individual insurance	-.09		
Medicaid	-.12		
Need Variables			
Good health	.15		
Fair or poor health	.43***	1.54	(1.15, 2.08)
Instrumental Activities of Daily Living (IADL) Limitations[b]			
Light housework	-.05		
Heavy housework	-.002		
Making meals	.33*		
Using the phone	-.007		
Shopping	-.01		
Managing money	.62***	1.86	(1.29, 2.67)

Table 31
Logistic Regression for Probability of Any Part B Medicare Mental Health Services, Medicare Current Beneficiary Survey (MCBS)[a] Community Sample
(continued)

Variable	Coefficient	Odds Ratio	95% Confidence Interval
Activities of Daily Living (ADL) Limitations[b]			
Bathing	.22		
Toileting	-.16		
Dressing	.05		
Eating	.08		
Getting in or out of chairs	-.14		
Walking	.02		
Mental Illness[c]	2.11***	8.25	(5.77, 11.80)
Physical illness			
Heart condition	.01		
Cancer	-.23		
High blood pressure	-.25		
Vascular condition	.26*		
Diabetes	.22		
Arthritis	-.06		
Osteoporosis	.24		
Paralysis	-.11		
Emphysema, asthma, or COPD	-.01		
Lives with others	.09		
Metropolitan area	.81***	2.25	(1.78, 2.85)

N = 9,625
C-statistic = .725
*p < .10; ** p < .05; *** p < .01
[a]N=9,625
[b]Note that individuals included in sample percentages for these variables "need help" performing these activities.
[c]In the NMES-IPC, the diagnostic variable *mental illness* was created by recoding seven mental disorders recorded in patients' medical records (senile dementia, depressive disorders, schizophrenia, other psychoses, anxiety disorders, personality disorders, other mental disorders) into four broad diagnostic categories: dementia and mental illness, dementia only, mental illness only, and neither dementia nor mental illness (none). In the MCBS, the presence of a mental illness was defined through self-report, combined with HCFA survey data indicating Medicare eligibility as a result of having a mental illness. In the NNHS, the procedure for developing mental illness indicators was similar to that for NMES-IPC.

Table 32
Linear Regressions for the Total Number of Medicare Part B Visits for Mental Health Services, Medicare Current Beneficiary Survey (MCBS)[a] Community Residents

Variable	Coefficient
Intercept	-.18
Predisposing Variables	
Age	.002
Male	.004
Hispanic	.03
Marital status	-.12
Number of living children	.01
White	
Enabling Variables	
Income	.06
Education	
9–11 years	.04
12 years	-.19
13+ years	.25*
Unknown	.09
Employer insurance	-.02
Individual insurance	.01
Medicaid	-.09
Need Variables	
Good health	.27**
Fair or poor health	.27**
Instrumental Activities of Daily Living (IADL) Limitations[b]	
Light housework	
Heavy housework	
Using the phone	.004
Shopping	.16
Managing money	.17

Table 32
Linear Regressions for the Total Number of Medicare Part B Visits for Mental Health Services, Medicare Current Beneficiary Survey (MCBS) Community Residents
(continued)

Variable	Coefficient
Activities of Daily Living (ADL) Limitations[b]	
Bathing	-.03
Toileting	-.08
Dressing	-.15
Eating	-.17
Getting in or out of chairs	-.004
Walking	.02
Mental Illness[c]	.56**
Physical illness	
Heart condition	-.06
Cancer	.05
High blood pressure	-.09
Vascular condition	-.12
Diabetes	-.03
Arthritis	-.12
Osteoporosis	-.10
Paralysis	.21
Emphysema, asthma, or COPD	.05
Lives with others	.13
Metropolitan area	.25**

N = 392
Adjusted R^2 = .06
*p < .10; ** p < .05; *** p < .01
[a]N=9,625
[b]Note that individuals included in sample percentages for these variables "need help" performing these activities.
[c]In the NMES-IPC, the diagnostic variable *mental illness* was created by recoding seven mental disorders recorded in patients' medical records (senile dementia, depressive disorders, schizophrenia, other psychoses, anxiety disorders, personality disorders, other mental disorders) into four broad diagnostic categories: dementia and mental illness, dementia only, mental illness only, and neither dementia nor mental illness (none). In the MCBS, the presence of a mental illness was defined through self-report, combined with HCFA survey data indicating Medicare eligibility as a result of having a mental illness. In the NNHS, the procedure for developing mental illness indicators was similar to that for NMES-IPC.

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